THE AGING AIRCRAFT SAFETY ACT

(101-49)

HEARING

BEFORE THE

SUBCOMMITTEE ON AVIATION

OF THE

COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION HOUSE OF REPRESENTATIVES

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

ON

H.R. 3774

TO AMEND THE FEDERAL AVIATION ACT OF 1958 RELATING TO THE SUSPENSION OF AIRWORTHINESS CERTIFICATES AT THE END OF THE ECONOMIC DESIGN LIFE OF AIRCRAFT AND FOR OTHER PURPOSES

MAY 1, 1990

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H.R. 3774, THE AGING AIRCRAFT SAFETY ACT—SUMMARY OF SUBJECT MATTER

The Subcommittee will take testimony on H.R. 3774, the Aging Aircraft Safety Act. The bill was introduced on November 20, 1989 by Congressman Oberstar and Congressman Clinger.

On September 27 and October 10, 1989, the Subcommittee held hearings on Assuring the Safety of Aging Airline Fleet (Committee Publication #101-25). For general background information on the issues associated with the aging airline fleet, a summary of subject matter prepared for those Subcommittee hearings is attached.

SECTION-BY-SECTION DESCRIPTION OF H.R. 3774

Section 1 provides a short title, the "Aging Aircraft Safety Act of 1989."

Section 2 directs the Federal Aviation Administration to initiate a rulemaking proceeding within 180 days to:

(1) Require the FAA Administrator to conduct (A) an inspection of each air carrier during the last year of its economic design life or, in the case of aircraft which are already beyond their design life, within one year of the issuance of regulations and (B) a review of maintenance records for such aircraft for the purpose of determining the adequacy of inspections and maintenance.

(2) Require air carriers as part of the inspection to demonstrate that maintenance on age-sensitive structure, parts and components has been adequate and timely to ensure the highest degree of safety when an aircraft is operated beyond the economic design life.

(3) Establish administrative procedures to be followed during the inspection.

(4) Require air carriers to make records available for the inspection.

(5) Establish a continuing program for reviewing and evaluating the aircraft periodically after the aircraft has exceeded the economic design life.

(6) Establish methods for determining the economic design life.

Section 3 requires the FAA Administrator to suspend airworthiness certificates on the last day of an aircraft's economic design life, unless the Administrator determines, after the inspection described in Section 2, that the aircraft is safe to continue to be used to provide air transportation.

ANTICIPATED WITNESSES

Representatives from the following organizations are expected to present testimony on the bill: Federal Aviation Administration, Air

Transport Association, Aerospace Industries Association, and the Air Line Pilots Association.

Assuring the Safety of the Aging Airline Fleet—Summary of Subject Matter

The hearing will receive testimony on the adequacy of government and industry actions to address safety issues and problems associated with the aging air transport fleet. It has been recognized for many years that as aircraft get older they require increased attention and maintenance. However, the Aloha Airlines accident on April 28, 1988, which involved a structural failure on a relatively old and heavily used aircraft, shocked the Federal Aviation Administration, the aviation industry, and the traveling public. The accident challenged the soundness of a number of assumptions that guided regulatory policy on aircraft age, structures, inspection, and maintenance.

THE ALOHA AIRLINES ACCIDENT

On April 28, 1988, an Aloha Airlines Boeing 737 enroute from Hilo to Honolulu suffered a structural failure while flying at 24,000 feet. The failure caused an explosive decompression resulting in the separation and loss of approximately 18 feet of the skin and structure of the top of the aircraft. One flight attendant was swept out of the aircraft and is presumed to have perished. Eight other persons on the aircraft were seriously injured. The flight crew was able to make an emergency landing at Kahulai.

The National Transportation Safety Board determined that the probable cause of the accident was the failure of the airline to detect the presence of disbonding of overlapping skin, metal fatigue and separation in the aircraft's skin and structure. The NTSB also found as contributing factors to the accident the failure of the airline's management to properly supervise its maintenance work force; the failure of the FAA to evaluate properly the airline's maintenance program; the failure of the FAA to require certain inspections proposed by Boeing; and the lack of a required fix in a particular structural joint after the discovery of a problem.

INSPECTION AND MAINTENANCE OF OLDER AIRCRAFT

Aircraft age can obviously be measured by the passage of time, but more important is the number of flights or cycles. The Aloha Airlines aircraft was manufactured in 1969 and had 89,680 cycles at the time of the accident, making it one of the most highly used aircraft in the world.

As an aircraft goes through a flight it is pressurized and depressurized placing stress on the aircraft skin and structure. Over time, the repeated pressurization and depressurization causes fatigue and cracking in the metal because the pressurization cycle causes expansion and contraction of the metal. If the cracks become too large in a critical location, the probability that a part or structure will fail increases along with the possibility of an accident.

It has been long understood that as aircraft age and the number of cycles accumulate, cracks will increasingly develop and expand. The FAA and the industry have a good understanding of where

cracks will develop after certain numbers of cycles on a particular type of aircraft. And typically, the FAA and the industry have prescribed that aircraft should be inspected for cracks at certain locations after a certain number of cycles.

It has been presumed that when a crack was found, its growth or propagation could be predicted, and if the crack were monitored, a repair could be delayed until the crack reached a certain size. When the crack reached that size, typically a repair would be required.

The Aloha accident demonstrated that the Achilles heel in this approach is the assumption that all potentially dangerous cracks can be discovered through inspections. Because inspections, often visual, of hundreds or even thousands of individual rivets can be tedious, boring, and sometimes difficult to do, cracks can be missed. Also little safety redundancy is built in when the inspections are done poorly and the cracks are not discovered. The FAA and the industry have now concluded that a system to ensure the structural integrity of aircraft cannot place so much reliance on inspections. The approach now being developed calls for repairs or modifications at certain intervals regardless of what inspections reveal.

FAA AND INDUSTRY ACTIONS SINCE THE ALOHA ACCIDENT

Approximately a month after the Aloha accident, the FAA convened an International Conference on Aging Airplanes to reevaluate the agency's and industry's approach to aging aircraft. Approximately 400 representatives of airlines, manufacturers and regulatory authorities from twelve countries participated.

The Conference made 27 recommendations to the FAA and the industry for changes in regulatory philosophy, as well as increased reliance on non-visual inspection techniques, improved maintenance record keeping, improvement in communications between the agency and industry, and new directions for research. The Conference also found that corrosion control needed to be integrally linked to the aging aircraft issues.

The most significant development since that June 1988 Conference has been the work of two industry task forces to develop recommendations to the FAA that certain Service Bulletins issued by aircraft manufacturers prescribing repairs for specific structural problems be made mandatory through FAA Airworthiness Directives.

Service Bulletins are maintenance documents developed by aircraft manufacturers describing a particular problem and how the problem should be fixed. Service Bulletins are usually followed by aircraft operators, but they are not required to do so by the FAA. When the FAA determines that a problem is significant enough to affect the safety of flight, an Airworthiness Directive is issued by the FAA and compliance with the relevant Service Bulletins becomes mandatory. If an Airworthiness Directive is not implemented, the aircraft cannot legally fly.

Typically, with respect to structural problems the Service Bulletins have provided two avenues for addressing problems. One approach was: After "x" number of cycles, begin inspecting for cracks in a particular location of the aircraft; if cracks are discovered,

repair them after they reach a certain size. This typically requires repeated periodic inspections in order to be sure that the anticipated crack would be discovered. As an alternative, the Service Bulletins have typically recommended that the inspections could be largely foregone if the part in question were repaired or replaced. This is known as a "terminating action".

The two task forces (one for Boeing aircraft and one for McDonnell/Douglas aircraft) reviewed all of the Service Bulletins pertaining to structural issues for the individual aircraft types and made recommendations that after a certain number of cycles or hours certain structural parts must be repaired or replaced regardless of whether cracks could be observed or not. In other words, terminating actions would become mandatory after a certain time interval, and the option of inspecting until cracks were discovered would be eliminated in a large number of situations.

The FAA is implementing the Task Forces' recommendations through its Airworthiness Directive process.

The cost of implementing the new Airworthiness Directive for Boeing aircraft is estimated to average $600,000 per aircraft and $800 million for the fleet. The McDonnell/Douglas aircraft repairs are expected to average $269,000 per aircraft and total $563 million for that fleet. Many of the modifications have already been made. Others will come later as individual aircraft reach certain numbers of cycles over the next few years.

A third task force is going through the same exercise with respect to foreign manufactured aircraft.

Beyond the three Task Forces to identify particular repairs that should be made mandatory, government/industry task forces have been established on future research and development, improved government/industry communications, and human factors in maintenance. The Subcommittee will receive testimony on the status of these efforts.

The FAA has announced a second conference on aging aircraft to take place in Baltimore on October 2 and 3.

AGE CHARACTERISTICS AND TRENDS IN THE AIRLINE FLEET

Concerns about the aging fleet have been further heightened by anticipated growth trends in the air transport industry. Passenger traffic is expected to grow from the current level of approximately 468 million passengers per year to 760 million in the year 2000. New aircraft production will not be able to keep pace with this growth resulting in numerous aircraft being operated beyond their economic design life. Typically the economic design life is 20 years or 60,000 cycles. (Economic design life describes how long an airline can expect to economically use the aircraft from the time of purchase. The term does not describe the technical limitations of the aircraft.

Presently, new aircraft being ordered today by the air transport industry will be delivered approximately five years from now. Because of this, the rate of aircraft retirements is expected to decline dramatically. Aircraft that at one time were expected to be retired are being kept in service to provide capacity to meet growing passenger demand. New production aircraft entering the fleet are in-

creasingly additions to the fleet and not replacements for older aircraft being retired. Also, relatively low fuel prices at this time make it economical to keep flying the older, less fuel efficient aircraft rather then retire them.

The number of aircraft 20 years or older and their proportion to the total fleet will increase dramatically over the next 10 years. In 1988, the world jet transport fleet contained 2,440 aircraft 20 years or older or 28% of the total. In 1995, 4,100 aircraft or 35% of the total will be 20 years or older, and in the year 2000 more than 5,700 aircraft or 40% of the fleet will be in this catetory.

Presently, the average age of the U.S. airline fleet is 12.7 years, with 20% of the fleet between 15 and 20 years and 26% older than 20 years. The average age of the U.S. fleet is expected to increase through the balance of the century.

101ST CONGRESS
1ST SESSION

H. R. 3774

To amend the Federal Aviation Act of 1958 relating to the suspension of airworthiness certificates at the end of the economic design life of aircraft, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

NOVEMBER 20, 1989

Mr. OBERSTAR (for himself and Mr. CLINGER) introduced the following bill; which was referred to the Committee on Public Works and Transportation

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A BILL

To amend the Federal Aviation Act of 1958 relating to the suspension of airworthiness certificates at the end of the economic design life of aircraft, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Aging Aircraft Safety Act of 1989".

SEC. 2. RULEMAKING PROCEEDING.

Not later than 180 days after the date of the enactment of this Act, the Administrator of the Federal Aviation Ad-

ministration shall initiate a rulemaking proceeding for the purpose of issuing a rule—

(1) requiring the Administrator to conduct—

(A) an inspection of each aircraft used by an air carrier to provide air transportation, during the last year of the economic design life of the aircraft or within 1 year after the date of issuance of such rule, whichever occurs last, and

(B) a review of maintenance and other records pertaining to the aircraft,

for the purpose of determining whether or not the aircraft is safe to continue to be used to provide air transportation and of determining the adequacy of inspections and maintenance carried out with respect to such aircraft;

(2) requiring the air carrier to demonstrate to the Administrator, as part of the inspection, that maintenance of the aircraft's structure, skin, and other age-sensitive parts and components has been adequate and timely enough to ensure the highest degree of safety beyond the economic design life of the aircraft;

(3) establishing procedures to be followed by the Administrator in conducting the inspection and review;

(4) requiring the air carrier to make available to the Administrator the aircraft and such inspection,

maintenance, and other records pertaining to the aircraft as the Administrator may require for the review;

(5) establishing a continuing program for reviewing and evaluating the aircraft periodically after the last day of such economic design life; and

(6) establishing methods for determining the economic design life of aircraft used by air carriers to provide air transportation.

SEC. 3. AMENDMENT OF THE FEDERAL AVIATION ACT.

(a) GENERAL RULE.—Section 609 of the Federal Aviation Act of 1958 (49 U.S.C. App. 1429) is amended by adding at the end the following new subsection:

"(d) SUSPENSION OF AIRWORTHINESS CERTIFICATES FOR AGING AIRCRAFT.—The Administrator shall issue, in accordance with subsection (a), an order suspending an airworthiness certificate of an aircraft used by an air carrier to provide air transportation on the last day of the economic design life of the aircraft or the last day of the 1-year period beginning on the effective date of this subsection, whichever is later, unless the Administrator determines, after an inspection of the aircraft and an investigation of the inspection, maintenance, and other records pertaining to the aircraft, that the aircraft is safe to be continued to be used to provide air transportation. A suspension under this subsection shall

remain in effect until the Administrator makes such a determination with respect to the aircraft.".

(b) CONFORMING AMENDMENT TO TABLE OF CONTENTS.—The portion of the table of contents contained in the first section of the Federal Aviation Act of 1958 relating to section 609 is amended by adding at the end the following new item:

"(d) Suspension of airworthiness certificates for aging aircraft.".

(c) EFFECTIVE DATE.—The amendments made by this section shall take effect on the 30th day following the date on which the Administrator issues a final rule pursuant to section 2 of this Act.

○

THE AGING AIRCRAFT SAFETY ACT

TUESDAY, MAY 1, 1990

U.S. HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON AVIATION,
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m. in room 2247, Rayburn House Office Building, Hon. James L. Oberstar (chairman of the subcommittee) presiding.

Mr. OBERSTAR. The Subcommittee on Aviation will come to order.

The subcommittee meets this morning to continue hearings on the aging aircraft issue, but this year with a specific focus on the Aging Aircraft Safety Act, H.R. 3774, which Mr. Clinger and I have introduced to propose a means of further legislation on the issue of maintenance of high time aircraft.

As we said when we introduced the bill, this was a proposal, one of many being undertaken by many sources, both inside and outside the industry, a focal point for discussion, one that we hope would engender widespread discussion among aviation interests, and it certainly has.

This is just two days past the anniversary two years ago of the Aloha Airlines tragedy over the State of Hawaii, when on April 28, 1988, Aloha's now celebrated but infamous flight came apart in the air, shocked the FAA and the entire aviation industry, and galvanized both of them into decisive action.

For flight attendant Clarabelle Lansing, it was a fatal tragedy. We hope that, and are encouraged by the actions taken since then, the loss of her life will not have been in vain.

To their great credit, the aircraft manufacturers, the airline companies, the FAA, and foreign airworthiness authorities did not try to paper over that incident with press releases, downplaying the tragedy or dismissing it as an aberration not likely to recur.

They knew something had failed. Not just an aircraft, and not just a carrier. A system had failed, and that system needed to be fixed promptly. They knew it had to be addressed on a system-wide basis and not a fix here and a fix there. To their great credit, all joined in promptly on an industrywide and cooperative, intergovernmental basis, to address this issue forthwith.

The most immediate result was the first Aging Aircraft Conference, held just about two years ago, that brought together aviation experts from all over the world. I remember with clarity and with great feeling the intense atmosphere in the room where that conference was inaugurated, the intensity, the interest, the determina-

tion on the part of all people to do something real, effective, and lasting.

This is not an industry that takes maintenance lightly; industry spends collectively over $5 billion and may be approaching $6 billion a year on maintenance, an industry whose watchword and password is safety, and an agency, the FAA, whose prime responsibility to the traveling public is to safety.

So actions were taken, a very comprehensive, three-part program involving Boeing Aircraft, Douglas Aircraft, and aircraft for regionals and commuters, to bring together all the collective experience and wisdom of those whose lives and livelihoods are intimately entwined with the aircraft and its function and operation.

Two of those groups have reported; a third has yet to report. The FAA, nonetheless, has moved ahead, picking up the recommendations of the two task forces, translating many of them into airworthiness directives. The manufacturers, to their credit, have also translated many of those recommendations into service bulletins and sent them out promptly to the carriers.

A good deal has been learned and a good deal of effort focused on two principal issues: metal fatigue and corrosion, and the interaction between the two. We the industry and the Government are learning more every day about those two factors and their unique synergism.

A third element, the human factors, is one that perhaps intrigues me the most because there is the area where I think we have so much growing to do. We may be able to develop the technology to discern with non-destructive testing methods the beginning of a crack or the beginning of a failure due to corrosion, and we may be able to devise the perfect fix, we may be able to develop the predictive methodologies to look in advance in order to find small cracks before they develop into large tears and big structural failures, but until we have dealt with the human element in maintenance and long term attentiveness to the problem of the aging aircraft, we will not have fixed the problem in dealing with the human element.

The boredom of repetitive testing, the boredom of looking at thousands of rivets, is one that we have to find answers to. The perhaps elusive problem of maintaining attentiveness at a very high, very elevated degree for all those who are involved in the maintenance and oversight of maintenance again is one of those human factors, and I've addressed that issue many times and laid out an eight-point program or proposal for dealing with the human factors, and I'm very pleased that the FAA testimony this morning addresses that aspect in some detail.

Obviously, this pending legislation has not met with unanimous approval in the industry or within the FAA, but it has sparked a great deal of thought and effort and attentiveness by this industry and by the FAA.

We will proceed from this hearing to make whatever revisions appear appropriate in the legislation and move forthwith to report legislation to the full committee.

The Chair recognizes the gentleman from Iowa for opening comments.

Mr. LIGHTFOOT. Thank you, Mr. Chairman.

I appreciate your holding this hearing this morning. A couple of quick things, I'll just make some brief remarks so we can right on with it.

The Chairman and a number of us on this committee made a trip on this particular issue back in December and had an opportunity to visit with one of the major manufacturers as well as one of the major airline's maintenance facilities to see exactly what they are doing in the area of aging aircraft, and, of course, we also had an opportunity to stop off and see what the folks are doing at Lockheed with the V-2.

I think that although this hearing today is on the overall issue of aging aircraft, there are some proposals standing in the wings that I think have some tremendous possibilities for us, and I think as we were joking about the tilt rotor, there's a possibility there of a new technology of aircraft to come along and replace a lot of the old airplanes that we're using and having some of these problems with.

In the area of the V-2, some of the new technologies they developed in manufacturing that aircraft I think offer tremendous possibilities on the civilian side of things in terms of composites, new kinds of materials that don't break down as rapidly as metal, and are not as easily subjected to fatigue like metal, and so on.

So there are some exciting things off in the wings, but in the meantime, dealing with the aircraft that we have to fly today, I think it's of utmost importance that safety be number one.

In my State, Iowa State University has a testing center that's called the Center for Non-Destructive Evaluation. The center addresses the aging aircraft issue. These are technologies that I think are the kinds of things that we need to be looking at as an interim step until we move into some new types of aircraft and new generation of aircraft.

With that, Mr. Chairman, I appreciate you holding the hearing and our witnesses being here today and look forward to what the folks have to say.

Mr. OBERSTAR. I thank the gentleman for his contribution and the information about the non-destructive testing center at your university.

The gentleman from Virginia.

Mr. PAYNE. Thank you very much, Mr. Chairman, and thank you for holding this hearing on H.R. 3774, the Aging Aircraft Safety Act of 1989.

I do applaud you and Mr. Clinger for introducing this legislation, I think it's a very important piece of legislation, and I thank all the witnesses who are here today, and I look forward to hearing your testimony and ask unanimous consent to have a statement entered into the record.

Mr. OBERSTAR. Without objection, so ordered.

[Mr. Payne's prepared statement follows:]

STATEMENT OF THE HONORABLE LEWIS F. PAYNE, JR.

Mr. Chairman, thank you very much for holding this hearing on H.R. 3774, the Aging Aircraft Safety Act of 1989. I applaud you and Mr. Clinger for introducing this bill last fall and appreciate this opportunity today to examine this piece of legislation.

The safety of the flying public is a primary concern of this Subcommittee, and I think it is very important that we continue to work to ensure that air transportation is as safe as possible. As our airline fleet ages, we should do all we can to make sure that these airplanes are as airworthy as they can possibly be. We are charged with the responsibility of assuring the traveling public that when they take a flight, all possible efforts have been taken to guarantee a safe journey. I, therefore, appreciate this opportunity to work to fulfill this mission.

I thank all of our witnesses for joining us today to share their views on this bill. I look forward to hearing your comments.

Mr. OBERSTAR. The gentleman from Ohio, Mr. McEwen.

Mr. MCEWEN. Thank you, Mr. Chairman.

I, too, wish to express my appreciation for your holding this hearing on what is obviously a very, very unclear area. It's a problem that you could possibly be flirting with disaster, because of the design of the aircraft, which is the finest in the world, and it has a design life, and there comes a time when that is up, and yet in many of those aircraft with the perfect maintenance of some of the great airlines, those planes are just in excellent shape and can fly twice that long, and yet other airlines that do not maintain their maintenance as well, we see that it's very, very dangerous.

So how do you draw a line? How do you identify that? Well, you try to have the FAA somehow or another inspect, and yet when we continue to put the obligation ceilings on the trust fund and we continue to constrain the FAA, they don't have the capacity to do what many of us in Congress have laid on their plate for them to do, and as a result there is a floating gray area that is just very difficult to identify and yet is very critical and could be disastrous.

That's why I thank you for holding this hearing and beginning to walk through this, because it can be very, very dangerous. It's not fair to the manufacturers who, as you say, do the service bulletins, it's not fair to the airlines that maintain excellent care of their aircraft, for us to pass a law and say after a certain time you can no longer fly that airplane.

That would be too drastic, and yet somehow or another we are going to have to find a way to make sure that the aircraft are all safe and, at the very least, we need to fund the FAA sufficiently so that they can assure us of that factor.

That's why those of us who share your concern applaud your holding this hearing.

Mr. OBERSTAR. Thank the gentleman.

Mr. Boehlert, the gentleman from New York.

Mr. BOEHLERT. No statement, Mr. Chairman.

Mr. OBERSTAR. Our first witness—oh, I'm sorry.

The gentlelady from New York.

Ms. MOLINARI. Thank you. It's a typical reaction still around here. Thank you, Mr. Chairman.

Let me just also state for the record and for you personally, as you know, my predecessor had great concerns over airline safety and probably spent more time in his Congressional career directed toward making this industry safer.

I am therefore gratified to be a member of this committee, especially at an important time when we're considering such an important bill and am delighted and thankful that you have brought us together with these important witnesses also to deal with this subject. Thank you.

Mr. OBERSTAR. The gentleman from Oklahoma?

Mr. INHOFE. No statement, Mr. Chairman.

Mr. OBERSTAR. Then at this time I would like to insert for the record the statement of our colleague, Jerry Costello, before proceeding to our first witness.

[The prepared statement of Mr. Costello follows:]

STATEMENT OF HON. JERRY F. COSTELLO

Mr. Chairman, today the Subcommittee on Aviation will address the issue of aging aircraft in our Nation. As we have discussed at prior hearings, passenger traffic is growing and in the St. Louis region alone, air traffic is expected to increase nearly 50 percent by the turn of the century.

In order to meet this increasing demand, the air transportation industry has been using planes to meet the growing number of flight passengers which under normal circumstances would be retired from use. This raises many questions about air safety that will be addressed today as we hear testimony regarding "the Aging Aircraft Safety Act."

H.R. 3774 is a reasonable solution and offers a safety net to this problem by requiring the Federal Aviation Administration to inspect aircraft during the last year of its economic design life. This bill would also require air carriers to inspect and maintain age sensitive components on all aging aircraft.

I look forward to hearing testimony by our expert witnesses and I want to thank you, Mr. Chairman, for your leadership and for conducting today's hearing.

Mr. OBERSTAR. Our first witness this morning is Mr. Anthony J. Broderick, Associate Administrator for Regulation and Certification for the FAA.

Welcome. We're glad to have you with us this morning and to have your very comprehensive statement, including your opening remarks and the supplemental information that provides in more detail your thoughts on this issue.

Please proceed.

TESTIMONY OF ANTHONY J. BRODERICK, ASSOCIATE ADMINISTRATOR FOR REGULATION AND CERTIFICATION, FEDERAL AVIATION ADMINISTRATION

Mr. BRODERICK. Mr. Chairman and members of the subcommittee, I welcome the opportunity to appear before the subcommittee today to provide you with the FAA's views concerning H.R. 3774. I will be brief.

The primary thrust of H.R. 3774 is for the FAA to conduct detailed inspections of aircraft during the last year of their economic design life to determine, first, that they are safe to continue to be used for air transportation, and, second, that inspections and maintenance carried out on such aircraft have been adequate.

Unless the FAA Administrator determines after such an inspection that an aircraft is safe to be used to provide air transportation, the Administrator is required to suspend that aircraft's airworthiness certificate. The airplane would be grounded.

I appreciate the intent underlying this bill and welcome the continuing focus that it brings on the issue of aging aircraft. We all know much more today about aging aircraft than we did two years ago or several years ago, and ongoing efforts are going to teach us even more.

One clear lesson we have learned is that the issue of aging aircraft is one that demands and deserves the continuing attention of the Congress, the industry, the public and the FAA.

Our fleet is indeed an aging one, and we must aggressively ensure its continued safety through research, analysis, surveillance, and, when appropriate, firm regulatory and enforcement action.

Although we certainly appreciate the added focus the bill gives to the aging aircraft issue, we do not believe that the approach contained in the bill provides us the best way to pursue advances in aging aircraft safety, and thus we do not support its enactment.

We are particularly concerned that the bill calls upon the FAA to perform inspections of aircraft once they have reached their economic design life. This approach presents me with both philosophical and practical problems.

It would represent a fundamental change in the way FAA works to ensure aviation safety. The FAA's longstanding role has been one of regulation and oversight. The bill would substitute the FAA's own safety inspection of an aircraft for an air carrier's inspection of the safety of that aircraft, thus shifting responsibility from the airline to the FAA, probably even so far as to make the United States Government liable for tort damages notwithstanding the Government's landmark victory in the Supreme Court's Varig decision, and diffusing the airline's accountability for the safety of its own aircraft and maintenance practices.

This proposed departure from traditional practice troubles us quite a bit. The bill also presents many practical problems which I do not believe are reasonably surmountable. To save time, I've attached to this statement a more detailed analysis, which I will briefly summarize.

The kind of inspection program envisioned by the bill would probably equate roughly to the "D" check, or the heavy structural inspection of an aircraft, which occurs roughly every four or five years, depending on the number of landings and takeoffs of a particular aircraft.

A very rough initial estimate indicates that we would need literally hundreds of additional airline maintenance inspectors, plus support personnel, facilities and equipment and engineers to perform this work in an average year.

In the first year after enactment, such efforts are almost impossible to contemplate conducting, as we would be required to inspect over 1,000 aircraft, a task that is simply unrealistic.

Despite the steady program we have had in place for five years to hire, train and field additional inspectors, we are still stretched too thin to devote our aviation safety inspectors to the performance of what is now an airline responsibility and task.

It is already difficult for us to meet fully the challenges we face daily in today's dynamic aviation industry. Even with the best of intent, and even with the funding necessary to hire substantially more inspectors, we could not sustain the additional training burden that would be required to train our personnel in the techniques needed to perform safety inspections of air carrier aircraft.

Our inspection personnel typically spend eight to 12 weeks in initial FAA training to perform the types of work we currently assign them. If it were necessary for large numbers of them to be continually proficient in actually performing aircraft inspections themselves, including proficiency in performing X-ray and other non-de-

structive testing techniques, that training, as well as its cost, would increase exponentially.

Therefore, Mr. Chairman, instead of a revolutionary change in direction, we would argue strongly for staying the current course of action we are pursuing with aging aircraft.

As you know, we have tightened up the inspection processes that are followed by the carriers. We have also established, after close consultation with industry and other governmental experts, specific times for replacement of critical aircraft components in lieu of mandating more and more inspections. Those two steps represent a significant step forward.

Additionally, we are continuing to vigorously pursue additional knowledge in this area. We are working with the Navy on corrosion techniques. They are helping design a training program for our inspectors. A major focus of our R&D Advisory Committee is on aging aircraft.

We are working hard to better understand the human factors associated with inspection techniques that you mentioned earlier, information which has not been available in the past.

FAA teams which comprise our newly formed Aging Fleet Group have participated with air carriers in the performance of "D" checks on nearly 20 aircraft, and that work is ongoing and planned for at least another year.

These teams have an individual looking at the human factors issues, engineers assessing the structural condition of the aircraft, and R&D personnel evaluating the effectiveness of non-destructive testing processes to determine better ways to conduct such tests. Of course, we also have a large number of maintenance personnel on those teams.

The first week of each inspection is typically spent reviewing the carrier's maintenance programs and training activities, whose effectiveness is then evaluated during the actual inspection of the aircraft, which our personnel carefully observe.

In short, I feel strongly that the agency's Aging Aircraft Program represents the best thinking and cooperative efforts of Government and industry. I am convinced that we are taking the right steps and doing the right things to ensure safety in the short term and to enable us to pursue the right courses of action and make the right regulatory choices in the long term.

I can assure you that Administrator Busey places a very high priority on this program and that as we learn more about aging aircraft we will not hesitate to take whatever additional actions may be needed to protect the flying public.

In closing, Mr. Chairman, I would like to stress my appreciation for the active interest you and your subcommittee have taken in this area and for the support you have given us. We look forward to working closely with you on this issue as we continue our program in this area. I would be pleased to answer any questions you have at this time.

Mr. OBERSTAR. Thank you very much, Tony. We appreciate your responsiveness and the care with which your statement was developed and want to again make it clear that the addendum will also be included in the record immediately following your delivered remarks.

There has been, as a result of the aging aircraft conferences, and more immediately right after the first conference, a change in philosophy about maintenance. I'd like you to describe that for us.

You've done that in the addendum, but I'd like you to describe the change in mindset about maintenance of high time aircraft on the part of the carriers and in the regulatory role that FAA plays in this matter.

Mr. BRODERICK. Mr. Chairman, you're absolutely right. For the last three decades of the jet age, we had relied very heavily on a continuous inspection program which looked for cracks to develop. The inspection program was designed to catch developing cracks before they became critical to the safety of flight of aircraft.

We were quite confident, along with members of the industry and governments around the world, that this program was effective. It, indeed, had been effective for nearly 30 years. But as you indicated, two years and two days ago, an event occurred with that tragic Aloha Airlines flight which shocked everyone and very quickly led us to recognize that that system did not work as well as we needed and it needed some major change.

The major change that I think we made was to require that each airplane design be reviewed and literally every piece of the structure gone over the service experience and design experience would fold into an analysis of when we could expect cracking to begin in that piece of the structure.

When we reached that conclusion, we then backed up an appropriate amount, given the particular criticality of the structure and the safety that we demand of the aircraft, and put a mandatory retirement time on that piece of the airplane.

In other words, we are saying that the programs that we now have in place and are finally enacting into law, which have been enacted into law for the Boeing fleet and will shortly be for the Douglas and other fleets, require you to stay ahead of cracks and replace structure before it develops a crack.

That doesn't mean that we don't need to inspect aircraft. Indeed, we probably are inspecting airplanes for cracks more intently now than we did before we had that change. But what it does is it adds a very large measure of confidence and indeed safety to the fleet, knowing that we are not relying on the human element to detect a crack that we suspect might develop, but we're, in fact, replacing the material before the crack has a chance to become significant.

Mr. OBERSTAR. Now, when you say putting a mandatory retirement time or time frame on that part, how does that philosophy apply to the hull of the aircraft?

Mr. BRODERICK. It applies to the hull on a part by part basis. What we have found over the past two decades of scientific research, for a lot of varied reasons, both in the military and civil sectors, is that our ability to predict a really hard useful lifetime for a complex structure like the airplane pressure vessel is quite limited. In fact, it's nonexistent.

Our ability to predict the useful life of an individual part without reference to the surrounding parts is indeed much more accurate. The reason our ability to detect or to predict the end to a useful life of a structure is so blurred is because, in fact, if you look at a complex structure, you really should predict the end of its

useful life when the first serious piece of it decays and becomes not useful anymore and not safe anymore.

Reality tells us that with the best engineering and computer tools available to the aeronautical scientists today and to the mechanical and structural engineers, their predictions of when this is going to occur 20 years hence are not perfect. That's what service experience does for us.

It changes the theoretical prediction of a designer who has never seen an airplane of that design actually fly and be used for 20 years into something that is more realistic. We actually use service experience to see where the design is weaker and, of course, where it's stronger and revise our initial maintenance program literally on a day-by-day basis as we learn things as structures age so that we can revise the design estimates and make the airplane a lot safer than it would be if we didn't do that and we relied solely on inspections.

Mr. OBERSTAR. Hull experience and working life is very different from that of other parts of an aircraft. The hull is the part uniquely subjected to stresses, frequently throughout the daily flying operation.

It isn't possible to just say, as with, say, a thrust reverser or an auxiliary power unit or with blades on the fan on the engine, that there's a certain time sequence at the end of which that part, no matter how good it looks, should be removed.

There was a time in this whole process when I thought, very early on, two years ago, that the best solution would be at a certain point in the accumulation of life cycles on an aircraft to remove certain parts of the hull altogether.

That sent shockwaves through those who are closely associated with manufacture and operation of aircraft, and I spent a fair amount of time with people who actually do the maintenance, the mechanics themselves, the sheetmetal workers, and found you don't have to go that far, you don't have to be that drastic.

You do have to be more meticulous about corrosion. I think we've learned a great deal more about corrosion, but it's still the hull that's the part I think that is the most elusive to deal with because of its unique relationship to the whole aircraft and the unique stresses to which it is subjected and perhaps the difficulty of discerning the long term effects of corrosion.

What are your current airworthiness directives that deal with corrosion and metal fatigue and rivet stress?

Mr. BRODERICK. We have an array of them. Actually, as you indicated in your opening statement, we have divided an advisory committee into task forces. The Airworthiness Assurance Task Force has working groups for the Boeing fleet, for the Douglas fleet, and for all other aircraft, and then, of course, we have cooperative efforts underway for the commuter fleet as well, but I'll focus mainly on the large airplanes today.

We have, in fact, completed work through the entire regulatory cycle of project development in cooperation with industry, proposal of regulations and enactment of regulations for the Boeing fleet of aircraft, the 727, 737, and 747, and there are approximately 150 worthiness directive actions that have been mandated as a result of that, and they range from very simple to very complex.

In addition, because of the focus that we had early on following the Aloha accident related to the rivets on the 737 and then because of design similarity with the 727, we have enacted or proposed a number of actions in various states of urgency to literally remove and replace critical fasteners which needed to be replaced because a bonding scheme in the early airplanes turned out to be not as reliable as people initially thought it would be.

That put additional stress on the fasteners, which transferred additional stress into the skin and caused the cracking that resulted in multi-site damage that caused the Aloha accident.

So I think we've addressed specifically the Aloha-related damage and corrected it, both on the 737, which was the Aloha airplane, and then the damage which intuitively one would expect to be similarly possible on the 727, although we, of course, have never seen that kind of extensive damage before, and we've proposed airworthiness directives that cover the entire structure of those two airplanes and the 747.

With regard to the Douglas airplanes, we've followed a similar path, but we haven't yet enacted the final rules. That's because the comments on the airworthiness directives and the associated voluminous service bulletins are being reworked in accordance with the best data we now have, and I expect in a few weeks to issue the Douglas airworthiness directives.

Those are similar in number to the directives that we issued for the Boeing fleet, and I would hope within a couple of months this summer to gather together the other airworthiness directives that we will be proposing for the Lockheed aircraft and the European manufactured aircraft.

We're working, as you indicated, very closely with European airworthiness authorities in this effort. So the current status of our effort is I think we've had remarkable cooperation from the industry, especially in light of the cost of this work.

You indicated that the industry probably spends $5 billion to $6 billion——

Mr. OBERSTAR. Just for the majors alone, yes. The second tier carriers are another $5 billion or $6 billion.

Mr. BRODERICK. These airworthiness directives, if you add up the worldwide cost for every airplane, some of them which aren't required to be modified for 10 or 15 years because they're brand new, but if you add up the cost for every airplane around the world, you're talking about at least several billion dollars in rework.

So the cooperation we've had in light of the expense that is being required of these things is quite commendable I think.

Mr. OBERSTAR. I have a number of questions, but I want to pose one now, about the bill, that is, one now and then go on to my colleagues and come back and revisit some of the others.

You're not comfortable with what you call a shift proposed in this legislation from the audit role of the FAA to an activist role, actually inspecting aircraft and doing hands on rather than paperwork reviews. One of the reasons you cite was a possible liability for the FAA resulting from that role.

Tell me how the FAA would be more exposed under the regime proposed in this legislation than it would under the current situa-

tion today. You now have authority and responsibility to inspect aircraft. What would change?

Mr. BRODERICK. I'm not an attorney, so I can't argue from a legal viewpoint, but let me give you sort of a practical viewpoint.

Mr. OBERSTAR. For heavens sake, let's keep them out of this.

Mr. BRODERICK. The basic role of the FAA is one of promoting and ensuring that the industry does its job. The FAA is not what I would call in the jargon of today's hearings a quality control organization. We do not take responsibility for controlling the quality of a particular series of specific individual actions.

Rather, we're a quality assurance organization. We have teams of people who spot check anything they think is appropriate to make sure that the programs that we require and that have been approved by the FAA are being properly carried out by the industry.

But we have argued in a number of legal cases and, in fact, all the way up to the Supreme Court that our role in this process is not one that should be relied on to control the quality of a specific inspection.

On the other hand, on page 2 of the proposed legislation, it is very clear that someone who buys a ticket on an airplane or who indeed buys an airplane that has passed the threshold set in the bill would be able by this statute to rely upon the Administrator having conducted an inspection, and in lines 11 through 15, determining, that is, the Government has determined, that the aircraft is safe to continue to be used.

That responsibility, which is what we read into those words, is now in the hands of the airlines, and what this language would appear to do would be to shift what is now an airline responsibility over to the FAA.

In doing that, it would do two things. One, it would subject the Government, the taxpayers, through the FAA, to potential liability. Frankly, that's not of greatest concern to me, although I'd be concerned about the taxpayers' liability, but the concern I would have is of the diffusion of responsibilities now and accountability.

Let's say we pick a 20-year life which for a particular airplane might be an economic design lifetime. If we now say at age 23 that the FAA has inspected that airplane and determined that it is safe, what responsibility do we expect the airline to have for that? Where is the balance going to lie with the new——

Mr. OBERSTAR. I think you've got a lawyer advising you with an overactive mind and an overactive desire for litigation, but maybe that's something we have to contend with, because that, while not an intended result of this legislation, may indeed produce that effect, certainly unintended again.

The words can be changed, but this is what the public expects. It expects the FAA to be watching over the carriers, they expect the carriers and the manufacturers all to be doing this, but they also expect the FAA to be watching over and making sure that aircraft are safe to fly.

Mr. BRODERICK. Mr. Chairman, I have absolutely no doubt that the public expects that, and you should have no doubt that I expect that of the FAA workforce that's charged with that responsibility.

Perhaps it is a legal nuance that is of concern. If that's the case, we'd be delighted to work with you and revise the wording so that that potential legal problem goes away.

You indicated earlier that this would shift us from being overseers to activists. I would hope and expect that in many areas we are seen as activists. The fact of the matter is that we don't hesitate to require changes to programs that are necessary in the interest of safety and aggressively enforce the requirements that we've laid down.

I don't see this as changing that, and I would hope that you would agree with me that that is what we need to continue doing. It's a question, really, of who has the responsibility for the final decision-making.

Mr. OBERSTAR. There may be some fine-tuning that is necessary to allay or alleviate fears about who has legal responsibility, but the thrust of the language is in the direction that I think is needed and certainly in the direction of which the task forces have moved, in which the philosophy of the manufacturers and air carriers has moved in the wake of Aloha.

I'll come back to deal with other matters of a look at aircraft and continuous rather than one-time maintenance checks, but I know that my colleagues have many questions they want to ask, both with respect to the bill and your testimony.

Mr. Lightfoot.

Mr. LIGHTFOOT. Thank you, Mr. Chairman.

Mr. Broderick, the bill requires that the FAA perform an inspection at the end of the economic design life of the aircraft.

We know that the engineers put their heads together and try to come up with what that economic design life is. I'm not trying to muddle this up with a little logic and common sense, but if you take the Aloha flight, for example, an airline that operates in very small confines of space, there are a lot of turnarounds on the airplane, a lot of cycles on the airplane, as opposed, say, to a 737 that one of our domestic airlines is flying here from, say, Phoenix to Omaha to D.C. and back. In that 20 years, you can have a lot of difference in the amount of hours that are put on the aircraft, or the number of cycles that are put on it.

Is there maybe a better tool than economic design life or a better point where this inspection should take place?

Mr. BRODERICK. I think that the economic design life that we're talking about is something that, as the bill itself indicates, needs to be defined.

There are really three things that we look at. We generally look at calendar time, and typically it's 20 years, although, as I indicate in the testimony addendum, it can vary all over the lot from, I've seen numbers as low as 13 years on I believe which was the original DC–9 life all the way up to 40 years, which is the life for a current European manufactured airplane.

The hours that the airplane is used in those years is, of course, very important, and that then becomes a significant variable. It also varies, depending on whether you're talking about something like a very long range airplane or a short range airplane, but we're typically talking about something between 40,000 and 100,000 hours for an initial estimate of economic design life.

Cycles of use are the most variable. For an airplane that's a very long range airplane, a 747 for example you're talking about perhaps 20,000 flights and maybe 60,000 or more hours because they are long flights.

For short range airplanes, well, we've seen now that the DC–9 has test data to back up a currently accepted design life of about 100,000 flights, about five times as many flights.

So these design lives are two things. First of all, they're initial estimates, as you indicated, set by designers who gauge a lot of their calculations on them, and I know that they form important parts of some commercial provisions between the manufacturer and the buyer, but second of all, they're dynamic. They change as we learn how the design is proving itself out.

Those changes have never been intended as necessarily a hard line. One of the things that we would have to do should this kind of legislation become law is spend quite a bit of time defining what we mean by this economic design life and how best we should define it, whether or not it's a static thing that you pick once and for the next 30 or 40 years it's the same number, or whether we should allow it to be changed based on the availability of service experience and better state-of-the-art analysis and computer data.

Those are all things that have yet to be developed. We don't have a number or a formula to suggest right now that would enable us to pick that design life, whether it's in time of years or of hours of use or flights of use.

Mr. LIGHTFOOT. I guess I can see an area of concern here in that if you only have one economic design life for a particular aircraft, to err on the side of safety, you're going to go with the worst case scenario.

Let's use the 737 as an example. If it's operated in operations such as they do out in the islands as opposed to someone who's flying cross country here on the mainland, if you use that island criteria, it's going to put the folks that are flying great distances here or longer distances at a disadvantage.

So is there potential that we could have a different economic design life for the same aircraft dependent upon use?

Mr. BRODERICK. Oh, absolutely. In fact, I think you'd have to have a number of different design lives for aircraft depending on use. Let me give you an example.

Let's take Aloha, which has a lot of inter-island service, very short flights, and it's a very intensive use of the airplane from the flight cycle viewpoint. That's one extreme.

Now let's take a small package carrier that purchases an airplane that is maybe 15 years or 18 years old, let's say it's a DC–9 with 50,000 hours on it and something on the order of 50,000 cycles.

If we're accepting today a design lifetime of 100,000 flights of the DC–9, with the low utilization every night of the airplane for the package carrier, it would be years and years before it would reach 100,000 flights. They're not going to be very long flights, so it's going to be years and years before it reaches 100,000 flight hours, so then you begin to say, well, okay, what's the significant thing about a design life calculation for this application, and it probably becomes time.

Now, time is important because of corrosion concerns about aircraft, but now you have to ask yourself is this package carrier using this airplane in Phoenix and staying in the desert southwest all the time, or are they using it in Hawaii, which might be a similar application of the small package carrier, but's a completely different corrosion environment.

So it's a very complicated thing, and I think that that's the reason that we tend to shy away from just one number or even an array of numbers, because of the fact that we don't have a technical basis for picking those numbers.

Mr. LIGHTFOOT. If this bill becomes law, do you have any estimates of what this might cost the airlines?

Mr. BRODERICK. No, we haven't looked at the airline cost. As it stands right now, it would be an administratively imposed additional inspection which we could expect to be quite expensive, several weeks down time for the airplane.

As the phase-in provisions of the bill is written, initially, at least, it wouldn't coincide necessarily with any of the heavy checks on the airplane, so if you estimate just very roughly, and the industry representatives that are here could give you a better guess, but if you take $25,000 a day and say that you're going to have the airplane stood down for something on the order of 20 days, that's a fairly large expense in and of itself.

You're then going to have a full crew of people, both from the FAA but also from industry, inspecting the airplane for a thorough heavy check. It wouldn't surprise me to see the costs of a check like that go up into the 20,000 or more labor hours at $40 or $50 an hour, so it wouldn't surprise me at all to see per airplane a cost that's on the order of somewhere between a little bit below a million and maybe as much as a couple of million dollars, depending on the size of the airplane.

Mr. LIGHTFOOT. To backtrack just a bit, I guess we tend to assume that we're always talking about pressurized aircraft. What about commuters and unpressurized aircraft? Should they fall under this as well?

Mr. BRODERICK. It's a completely different problem with unpressurized airplanes, and generally speaking we would counsel that, no, they not be lumped in with pressurized airplanes.

In unpressurized airplanes, typically it's the wing structure or corrosion that you're concerned about, which is a completely different and, frankly, better understood series of problems.

With the pressurized airplanes, whether they're small commuter airplanes or large airline aircraft, you have a similar difficulty in the pressurization and depressurization of the fuselage, but the structural differences are very large.

We have a completely separate set of people working on the commuter airplane problem for that very reason, and I would urge that we try and draw the line such that we're talking here, typically about the very large airplanes that are used, the smallest of which is a small DC-9 or BAC-111 or that kind of thing.

Mr. LIGHTFOOT. I think we tend to think in terms of aging aircraft air frame rather than power plants. What about engines?

Mr. BRODERICK. Well, the reason we think in terms of air frames and not power plants is because we have, for some reason, accepted

in power plants what we have just begun to do in air frames. That is, that as parts become older, they're swapped out before cracking is allowed to develop, and rather than looking at the engine and doing an overhaul like we used to do 30 or 40 years ago with piston engines, we're continuously removing parts that are reaching the end of their useful life.

If, in fact, we can't establish good lifetimes, we do tests on these parts and put appropriate safety factors on them and remove them at the end of what's called a safe life, which is conceptually similar to what we are now doing with pieces of the fuselage structure.

It's a little bit puzzling to me as to why it is that we do accept that approach, that is, a continuance maintenance and continual refurbishing forever literally, but we seem not to do that in aircraft structure.

I think it's because the aircraft structural application of that same concept is only a couple of years old, and it will take people a while to become comfortable with it. But it is conceptually the same thing, really.

Mr. LIGHTFOOT. Is that a blueprint you think we'll follow?

Mr. BRODERICK. I would urge that we do so, because it works so well in the engine business. We're right now, literally I think, in the middle of a program following the Aloha tragedy which is giving us a wealth of data and understanding.

We've got major changes going on in everything from structural applications to human factors. I think in the human factors area, we're probably going to make more progress than in any of the other areas because we had almost a zero baseline to start with.

What I would like to see us do is address these issues, all of which are very important that are in this bill, but address these issues when we have all that data available, and that's not going to be tomorrow or next month.

With cooperative industry and Government efforts and other governments around the world, we've got programs laid out for another 18 months, and it will take us that long to accumulate all the data to develop the model programs for corrosion control and for structural maintenance and knit those all together and figure out what additional changes we need to make.

We are certainly not, in the FAA, taking a position that no changes need to be made to maintenance programs. In fact, quite the contrary, based on what we've done, we won't hesitate to continue to make changes over the next year or two.

What I think we're concerned about is that we are not ready right now to make a major departure from what we have been doing without the scientific data to go with it. Once we get that data, we'd be delighted to make appropriate changes.

Mr. LIGHTFOOT. One last question, Mr. Chairman.

If the bill is enacted, do you have the people and the resources to conduct the inspections as would be required?

Mr. BRODERICK. No, sir. As indicated in the addendum to our statement, I think that it would be unrealistic to expect that we could staff up and train these people in anything less than about five years, and that's an extraordinarily rapid rate.

We would likely have to, looking at the bill the way it's constructed, double the size of our airline maintenance workforce, add

a significant number of engineers, and then get them trained and proficient and maintain that proficiency in skills that, while they're familiar with and able to deal with, they're not trained and proficient in those today, because it would change the nature of their jobs.

Mr. BOEHLERT. Would my colleague yield on that one?

Mr. LIGHTFOOT. Certainly.

Mr. BOEHLERT. Tony, you said it would take you five years to staff up and train the personnel you would need? I find that hard to believe, particularly at a time when we're getting the first remnants of the peace dividend that are not as positive as a lot of people would like, when General Electric and companies like GE all over the country are beginning to lay off because defense contracting is down, and what they're laying off are highly skilled employees, engineers, the very type of people you would need.

Are you suggesting to us realistically it's going to take five years to train those people?

Mr. BRODERICK. No, I said hire and train. I think it would take about three years——

Mr. BOEHLERT. I can tell you how you can hire them in about half an hour. Give me 30 minutes, and I'll get you some hired. Now, how long do you need to train them?

Mr. BRODERICK. It takes about a good three years with a person that is skilled and basically has an air frame and power plant license and understands non-destructive testing to become proficient in that.

The kinds of things that we do, you talk to some of the airline representatives about the kinds of training programs that they have in place, you don't just show someone how to use one of these pieces of equipment. They have to become very, very proficient in using it and interpreting the results, and that takes a minimum of several years to reach that level of proficiency.

Mr. BOEHLERT. I can accept that, but I think your five-year time frame is much too long.

Mr. BRODERICK. Well, if you'd accept a couple of years, let me just tell you that from experience of someone who has done it, and we have been doing it in the past few years, the system for bringing people on board the agency, getting facilities, getting training programs, building new offices and all that is something that, to add 500 inspectors, and that's roughly the kinds of numbers I'm talking about for airline maintenance inspectors, to add 500 inspectors and have them actually functioning as a cohesive unit within a couple of years is quite a challenge.

Mr. BOEHLERT. I'll accept that amendment, within a couple years, but I would like you to be thinking in terms of using a resource that is becoming more available every single day out across America, and that is the highly talented, highly skilled people that, because of the down turn in defense spending, are finding that their jobs no longer will be there for companies like GE, for example.

In my district, in Utica, New York, they announced a 30 percent reduction over the next three years in its facility there. In neighboring Syracuse, it was 900 and some odd people.

We're all excited about the peace dividend. As a matter of fact, I'm ecstatic, but those 3 or 4 percent of the people who are going to

be adversely impacted have to be a subject of concern, and I would suggest to you that that's a pool of talent that's ready, willing and able to come into a particularly high skilled job like you're talking about within a shorter time frame than five years.

Mr. BRODERICK. You're absolutely right. We can certainly hire them and begin the process in a lot less time.

Mr. BOEHLERT. Okay. Thank you.

Mr. LIGHTFOOT. Thank you.

Thank you, Mr. Broderick.

Mr. OBERSTAR. I want to thank the gentleman from New York for that intervention. A very thoughtful suggestion. After a decade of early neglect and later catch-up ball on inspectors, there's no reason to be projecting a five-year period of time to have sufficient personnel to undertake this work.

The gentleman from Oregon, Mr. DeFazio.

Mr. DEFAZIO. Thank you, Mr. Chairman.

Just a couple of questions, following up on your testimony and some of the earlier questions. You said to establish the parameters of economic design life would have to do with conditions under which it's used, some things you measure in terms of how old they are, some the conditions they're used under, others actual numbers of flights.

Wouldn't it be possible and perhaps desirable to have the manufacturers make some specification before things are placed into service?

Mr. BRODERICK. They currently do that. They select one of each of the calendar time, hours and flights, but, of course, when they do this, that's a general rule for across the board typical use, and it doesn't take into account the kinds of extremes I was talking about.

Mr. DEFAZIO. Right. Well, I'm somewhat familiar with Boeing and have visited McDonnell Douglas, and they have a lot of very smart people there. Don't you think they could develop a slightly more elaborate computer program that would take into account certain variables, and you could develop a program for each plane as it's produced and plug in its maintenance and its use as it goes along, and that is kept either by the airline using the program of the manufacturer or actually the data is transmitted back to the manufacturer, and we basically accumulate the data in an individual file for each aircraft as we go along, and at some point you'll get little caution lights, we're approaching a certain point, or you can just project forward if you continue this certain use, it will reach its economic design life? That would be possible.

Mr. BRODERICK. Oh, certainly. Certainly.

Mr. DEFAZIO. Okay. If you're so concerned about the difficulties and the burden it would place on the FAA to set this, wouldn't it be desirable to the FAA just to mandate that each manufacturer do that?

Mr. BRODERICK. That's, in fact, what we do with operators now. We require that operator maintenance programs be tailored to the aircraft that they've got and the use that they're making of it in the environment that they're using the airplane, and that's why airplane maintenance programs are all different.

Everybody looks at airplane maintenance programs in a different——

Mr. DEFAZIO. But how about melding those two concepts?

Mr. BRODERICK. Absolutely. No problem at all.

Mr. DEFAZIO. Okay, but it hasn't been done, essentially?

Mr. BRODERICK. Well, it is being done right now for maintenance, and what I understand you to be saying is that now we should make a determination of when we have reached or are about to reach what is called the economic design life. I'm not quite sure I understand.

Mr. DEFAZIO. Well, what I'm trying to get at is what the Chairman is trying to do with this bill and talk about, you know, a way of establishing the parameters that you say would be so difficult to establish, and that is through a real time, real life usage and maintenance of each plane correlated back to all the design specifications of the manufacturer.

Perhaps, you know, I mean, the programs aren't immutable, they might be changed given variances in experience, but basically to have that accompany each plane.

Mr. BRODERICK. I agree with you. I'm sorry if I was misleading. I didn't mean that it was difficult conceptually for each plane. What I meant was that it was difficult to do it so that all planes have the same number.

Mr. DEFAZIO. Well, no, and I doubt that the Chairman would advocate that we somehow set the same number for each and every plane.

On page 5 of your testimony, when you talk about the FAA teams, I'm again looking for some middle ground here. You talk about the FAA team that had participated with air carriers in performance of "D" checks on nearly 20 aircraft. What percentage of "D" checks does that constitute?

Mr. BRODERICK. Well, a very small number of "D" checks.

Mr. DEFAZIO. Well, I'm just looking for alternatives here. What we're looking for is a higher level of assurance for the flying public, for this committee, you know, for everybody, that we won't have anymore unforeseen, you know, mid-air problems.

Since the ones we had were unanticipated, we don't know what other ones might be out there that we might not be anticipating.

Mr. BRODERICK. That's precisely correct.

Mr. DEFAZIO. So, one is, we're having a philosophical difference here, which is, you know, whether or not we should set, you know, some sort of final standard versus the current way we maintain planes, and at that point something extraordinary has to happen to it if it's going to keep flying versus the "D" checks and the level of assurance we have if the "D" checks were conducted as rigorously as possible.

I visited the United facility, and it's very tedious work, checking every rivet on a 737, and the question is wouldn't it at least, if you can't accept the concept of this bill and the mandates the bill puts on you, wouldn't it at least be desirable to have participated in more than 20 of the "D" checks at this level of scrutiny so that we can be certain that "D" checks are being consistently carried out?

Mr. BRODERICK. If there is indeed a value added, I would agree with that. I would like to talk about what it is that we'd like to get

out of that participation. We're right now doing about two "D" checks a month for the purpose of working with industry and developing a model corrosion control and inspection program, and that is something that we set out to do last year and think is going to contribute greatly to our knowledge.

But it's not clear to me, if what we're looking at is Government oversight of inspectors on the job, and you're talking about just more oversight of inspectors, it's not clear whether the best place to do it is at "D" checks or at "C" checks or at ramp checks or where.

But I get your point, and certainly if it's increased oversight that we're looking for, that's one way to get it.

Mr. DEFAZIO. Well, I guess I would say all of the above would be my answer. I would like to see, you know, more hands on at all those levels or more over-the-shoulder if it isn't hands on.

Mr. BRODERICK. With the additional inspectors that this committee has supported and we've been hiring, that's exactly where we're putting our emphasis right now. We're shifting away from paperwork, which was our sort of last resort with the few inspectors that we had back in the early 1980s, and now we're getting from paperwork more and more into the hands on work and oversight.

Mr. DEFAZIO. How did we get to the point of just doing paperwork?

Mr. BRODERICK. Well, I think it arose because of the shrinking workforce, the burgeoning industry, and it's the most efficient way to get a broad look. It's the last thing you can look at.

Mr. DEFAZIO. Where were the watchdogs? Where was the secretary? Where was someone to cry out and say, you know, we're just becoming a group of paper shufflers here, the flying public isn't being assured that anything other than the paperwork is being done correctly?

Mr. BRODERICK. Well, I think they weren't doing that in the early 1980s, and beginning in 1984 we did that both with this committee and with the Appropriations Committee, and, frankly, got very good response and support.

Mr. DEFAZIO. Thank you.

Thank you, Mr. Chairman.

Mr. OBERSTAR. The gentleman from New York, Mr. Boehlert.

Mr. BOEHLERT. Thank you, Mr. Chairman.

Just a quick one, Mr. Broderick. What are you looking for in terms of qualifications for inspectors? Because I can get you some applications in a hurry.

Mr. BRODERICK. Typically, we look for people that have an air frame and power plant license from the FAA and have some kind of supervisory experience, at least a couple of years of supervisory experience in industry, actually supervising people doing the work, because that's analogous to what they're doing, as opposed to actual working experience, which is, of course, what they achieve before they get to supervisory experience, but we're looking for more experienced and more senior people.

It's very possible, in fact, it's not possible, it's true, that the so-called peace dividend is providing us with a very good pool of skilled people from which to draw.

Mr. BOEHLERT. At a previous hearing on aging aircraft, I asked this question specifically about aircraft maintenance and what industry was spending, and you provided us a chart that demonstrated that total industry spending on aircraft maintenance was increasing.

My question is, how much of that is due to the number of aircraft and the total fleet increasing rather dramatically? How much is due to inflation? What I'm really driving at is, is airline industry spending on aircraft maintenance going up on a per aircraft basis when adjusted for inflation?

Mr. BRODERICK. Well, I think you'd have to ask the industry members for better data than I have, but I can tell you that looking at the requirements that we've imposed on the industry with these new airworthiness directives and the increased focus that we've put with our over-the-shoulder inspections on the industry workforce, I can't imagine it not going up.

I read just recently one account that had one of the major airlines increasing its maintenance budget from something on the order of, it's detailed in the statement, 15,000 or 20,000 hours for a "D" check for a 737 up to 45,000 hours.

Part of that is due, of course, to the aging of the aircraft, and a lot of it is due to the airworthiness directives, but there's no doubt in my mind that if you use the reference point as two years and two days ago, there is a marked difference between what industry was doing three years ago and what they were doing a year ago or today. Much increased attention to the aging aircraft problem.

Mr. BOEHLERT. How many airworthiness certificates have been suspended in the past year?

Mr. BRODERICK. I honestly don't know the answer to that. I know we just suspended about five last week on a commuter airplane fleet, because our inspections showed that they weren't meeting the standards that we required for corrosion and safety, so we suspended their airworthiness certificates until they could fix the problem, and if they don't, of course, they just won't ever fly again.

Mr. BOEHLERT. One example. In the past year, what's the trend line? Is it up, down, level?

Mr. BRODERICK. Oh, it's up because the fleet is getting bigger. The fleet is getting bigger, and we have more inspectors, so just naturally I would expect any activity to grow a little bit.

There certainly are not large percentages of the fleet being grounded because they don't meet inspections, because the industry, in fact, has on the whole an excellent maintenance program. It's only the unusual case that you find a need to ground an airplane.

Mr. BOEHLERT. The suspension, that's sort of the last resort. Isn't there a warning before the suspension?

Mr. BRODERICK. No. We looked at a transport category airplane, I think it was a 707, two weeks ago. It was operated by a foreign carrier, but it was an "N" registered airplane, and it was therefore our responsibility, and it did not appear to us to be in condition for service, and it didn't move. We issued a ferry permit, but they had to cancel their flights and ferry it to a repair station.

So we give you a warning if we think you're maintenance program can use improvement, but if we look at an airplane and think

that there's a safety problem with it, there's no warning. We ground the airplane immediately.

Mr. BOEHLERT. Would you be willing, subsequent to this hearing, to provide for the record for the past 12 months, one, the number of suspensions, and, two, the warnings issued?

Mr. BRODERICK. I will be happy to survey our field. I don't know that we have records on warnings, because mostly they're taken verbally. We do have some what we call administrative actions, and I can get you data on that, which is just letters we've sent to people.

Mr. BOEHLERT. Wouldn't you want to keep records on warnings? I mean, some people might be habitual offenders, and if you're issuing a warning every month, for example——

Mr. BRODERICK. I see your point. If it's that kind of a warning, which is the kind that ought to be documented, we do, in fact, document it, so I can get you data.

Mr. BOEHLERT. Thank you very much.

Thank you, Mr. Chairman.

Mr. OBERSTAR. In submitting that documentation, which Chair will, without objection, include in the hearing record, include as well the cause.

Mr. BRODERICK. Okay. I'd be happy to.

Mr. OBERSTAR. Not just a statement of the event but the cause.

[The information received from Mr. Broderick follows:]

Calendar Year 1989
Closed/No Action Enforcement Cases

Case No.	Violator	Category	Regulations Violated	Final Action Date
88SO170003	Houk Corp.	Maintenance	ACT 609	01/06/89
88NM010052	ID Expunged	Maintenance	ACT 609(A)	07/17/89
89SW010107	Westernair Inc.	Other	ACT 609(A) ACT 1005	09/18/89
88SO170012	Air South	Maintenance	91.165	01/04/89
89SO170150	Aeronautical Training Co.	Records/Rpts.	91.173C	10/19/89
88SO170010	ID Expunged	Maintenance	91.165	02/27/89
89SO170019	Htz Leasing	Maintenance	91.165	02/28/89
89SO170039	ID Expunged	Maintenance	91.165	02/28/89
77SO170036	MD Air Service	Maintenance	ACT 609	04/04/89
89SO170008	ID Expunged	Maintenance	91.165	02/07/89
89AL000013	Troy Air Inc.	Maintenance	21.181A1 ACT 610A1	04/27/89
89AL000014	Troy Air Inc.	Maintenance	ACT 610A1 21.181A1	04/27/89
89AL000015	Troy Air Inc.	Maintenance	ACT 610A1 21.181A1	04/27/89
89SO170060	Ras USA Inc.	Maintenance	ACT 609	03/22/89
88SO170035	MD Air Service	Maintenance	ACT 609	08/25/89
88SO170014	MD Air Service	Maintenance	91.165	08/25/89
88SO170013	MD Air Service	Maintenance	91.165	08/14/89
88SO170006	ID Expunged	Maintenance	91.173C	05/11/89
88SO170070	MD Air Service	Maintenance	ACT 609	08/25/89
88SO170009	MD Air Service	Maintenance	91.165	08/25/89

Calendar Year 1989
Closed/No Action Enforcement Cases

Case No.	Violator	Category	Regulations Violated	Final Action Date
89AL000017	Troy Air Inc.	Maintenance	ACT 610A 21.181A1	06/20/89
89AL000018	Troy Air Inc.	Maintenance	ACT 610A1 21.181A1	06/20/89
89SO170160	ID Expunged	Maintenance	91.165A	09/05/89
89SO170005	Unique Aircraft	Records/Rpts.	ACT 609A	06/05/89

Mr. OBERSTAR. Mr. Stangeland, before departing to go to another commitment, wanted to raise just a question about the statement you made in response to Mr. Lightfoot, that foreign aircraft manufacturers build their aircraft to last 40 years. Clarify that. What type of aircraft?

Mr. BRODERICK. There is one aircraft and I don't remember, but I can supply it for the record, one of the European manufacturers has an aircraft which has an estimated economic design life of 40 years.

See, that's the problem with these kinds of things. From a technical viewpoint, from my viewpoint, or from our maintenance inspectors' viewpoints, that doesn't mean much. It may have something to do with some kind of economic warranties or what have you that people have signed contracts for, but we don't ascribe any special significance to that number from the viewpoint of the maintenance program or the design or anything.

So I wouldn't take that kind of comment, which is, in fact, a factual comment, but I wouldn't take it as meaning something.

Mr. OBERSTAR. Is that a pressurized aircraft, from your recollection?

Mr. BRODERICK. Yes.

Mr. OBERSTAR. I didn't think it would be.

The gentleman from Texas, Mr. Laughlin.

Mr. LAUGHLIN. Hello, Mr. Broderick. Would the FAA find it useful to change the regulations to require a vice president of quality assurance with an inspector general type function that reported directly to the chief executive officer with no one in between?

I ask that noting that in all military aviation units, they have a safety officer who reports directly to the commanding officer and not to other officers in the military unit structure. Would you comment on that, please, sir?

Mr. BRODERICK. Yes, sir. Mr. Laughlin, we already have a required position in every airline that's called the chief inspector, who, I think, forms the same function that you would be thinking of. We also require each airline to have an inspector workforce which is separate from the maintenance workforce that reports to the chief inspector, and it must be clearly spelled out in the organization chart.

We don't detail precisely to whom that person reports, only that we separate the inspection and the maintenance functions. But we do require that kind of function, and, of course, I am sorry, we also don't require a title for the person, other than it's the chief inspector from our regulatory viewpoint.

Mr. LAUGHLIN. Well, I want to assure you I am not interested in the title. I am interested in the function. It seems to me if we are going to make safety the number one priority in our operation, and that is the safety of the American traveling public, that we ought to have someone with that function who talks to the boss, regardless of what the company may call him by title. Do you follow what I am talking about on that concept?

Mr. BRODERICK. Precisely. As I indicated, we require a separation of the functions. We don't specify to whom the chief inspector reports, but we do require a separation of the function from the maintenance function.

Mr. LAUGHLIN. Well, it seems to me that if the chief executive officer of an airline company knows that there is someone who is going to be reporting to him on safety, it would give it a higher standing.

We hear that talk here; people wanting to be positioned so that they can talk to the President of the United States. It gives their area of jurisdiction more importance, and it seems to me if we are going to tell the American public that safety is foremost in our operation that safety officer, or whatever his or her title may be, reports directly to the chief executive officer or the president or whatever title we may have who is running the company.

Mr. BRODERICK. Well, I know, Mr. Laughlin, of no large airlines that don't have a function in addition to the inspection function that's similar to what you're talking about, a vice president for quality assurance, a vice president for compliance, or something like that.

It's not required in our regulations, but as a matter of general industry practice, the major airlines do, in fact, have another independent function from inspection and maintenance that I might call the safety function.

Mr. LAUGHLIN. Well, you agree then that safety should be foremost in all appearances and in practice?

Mr. BRODERICK. Yes, sir.

Mr. LAUGHLIN. Thank you. The Air Line Pilots Association advocates full-scale pressurization fatigue testing to at least twice the service lives of aircraft types. What is the FAA's view of undertaking this sort of testing?

Mr. BRODERICK. We agree with it. We do think that certainly any airplanes that are designed and built from now on will have that. Virtually all that have been designed and built in the past have been tested to at least two lifetimes.

I might point out that the kind of problem that we saw, for example, with the Aloha airplane, the multi-site damage problem that arose from failure of an adhesive type of bond between two metal surfaces, would not generally be expected to show up in these fatigue tests, because the actual corrosion and aging effects can't be easily simulated in the few months or few years that that testing would be taking place. So it has very good use, but it's not a panacea.

Mr. LAUGHLIN. The airline pilots also suggest that the service difficulty reporting system be overhauled and that the FAA started thinking about doing this some five years ago. Can you give us a status report on making the service difficulty reporting system a better safety tool than it is today?

Mr. BRODERICK. Yes, sir. One of the working groups that we have under the Airworthiness Assurance Task Force is looking at information flow. Basically, we agree with that, we started that effort I believe in June of 1989, and we know that there needs to be a complete overhaul of the system, not only from the industry viewpoint but from the Government viewpoint.

Mr. LAUGHLIN. Since the FAA started rethinking on that some five years ago, can you give us some expectation when we might see an overhauling of that system?

Mr. BRODERICK. Well, ALPA said that we thought about it five years ago. I must tell you I think it's been probably a lot longer than that. I would expect that sometime within the next 12 to 18 months we'll get solid recommendations for a complete redo of the system, and whatever regulatory changes are needed, I would expect that we'll be implementing them before we actually institute regulatory changes and just use that as a clean-up.

Mr. LAUGHLIN. We can expect to see those in the near future?

Mr. BRODERICK. You can expect to see changes really starting next year, I would expect, yes.

Mr. LAUGHLIN. I want to go back to the safety officer concept discussion I had with you a few moments ago. Perhaps you and I were talking about the large airline operators. I really want to focus on the small company operations and ask if the FAA has focused in any other manner to ensure that the small operators have a safety officer in place and that that safety officer has real responsibilities and reports to the chief executive officer of the small operator?

Mr. BRODERICK. We don't have a regulatory requirement for a safety officer. We have the same requirement for the separation of inspection and maintenance functions, but if we're talking about literally the smallest kinds of airlines, I would really question whether or not we would rather have them invest the resources in hiring perhaps only one person to perform this function or encourage them to hire an outside expert consulting type firm that could come in a few times a year and do audits and surveys.

Either way, I think can work, but whether or not we should require them to have the people on the staff is not clear. We certainly, for example, as you know, don't require them to have maintenance people on the staff.

They can actually contract with competent people to do maintenance, contract with another airline, so it's not clear that we'd want to restrict people and force them to have only their staff do safety audits for them.

Mr. LAUGHLIN. So safety is no less important in the small operator than it is in the large operator?

Mr. BRODERICK. Oh, absolutely.

Mr. LAUGHLIN. Thank you very much.

Mr. OBERSTAR. The gentleman from Tennessee, Mr. Clement.

Mr. CLEMENT. Thank you, Mr. Chairman.

How do you decide about FAA maintenance inspectors, about where they'll be located?

Mr. BRODERICK. We have a staffing standard, it's called, which takes every one of the work functions that an inspector does, and we have offices throughout the country, nearly 100 offices, and they have a geographical area of responsibility.

Each industrial operation, if I could call it, whether it's a pilot school or flight school or maintenance facility or a repair station or an airline or an airport, is counted, and what work is being conducted at that facility is noted.

We take the staffing requirements to do that work, and we merge the two of them in a computer program which can tell us for every office in the country how many of each different skill inspector we need, whether they be operations inspector or manufacturing inspectors or maintenance inspectors or what have you.

So bottom line is, we look at the geographic community that we're serving, we look at what we're doing for that community, and we have a formal standard that tells us how many people it takes in that community to do that job.

Mr. CLEMENT. Well, Mr. Broderick, would you say in certain areas of the country we're overloaded, where in certain areas we're not?

Mr. BRODERICK. Because of the fact that we've been growing very rapidly and adding staff, it may very well be that there are offices that have a higher workload relatively speaking than others. I would expect that by the end of 1991, when we have reached the end of our growth plan that we've been on for the last few years, that that will disappear.

Mr. CLEMENT. Well, you know, certain FAA maintenance inspectors naturally would like to live some places rather than other places simply because of what a particular community or city offers, where some areas might look like hardship duties rather than other places, but, you know, we've got to go where the need is, we've got to go where the problem is, and we don't necessarily ought to look at because this is an attractive city, then I want to be located there even though the need is somewhere else.

I wish you'd look at that real closely when it relates to where you locate maintenance inspectors and make sure that we're getting the proper utilization out of those people where they can serve a useful purpose.

Mr. BRODERICK. I couldn't agree with you more, Mr. Clement, and if, in fact, we make a mistake, I'd sure like to correct it, because the fact is that for a lot of reasons, administrative and economic, as well as just public service, we need to put people where the job is.

Mr. CLEMENT. Well, I just think that's unfair to various industries, too, where they're overloaded with inspectors simply because inspectors want to live in that particular city when we've got a great need somewhere else that's underserved.

Mr. BRODERICK. We try not to do that, and it's not our intent to do that.

Mr. CLEMENT. All right. Thank you.

Mr. OBERSTAR. Mr. Broderick, one of the major characteristics of today's airline industry is the leasing of aircraft. Probably half of today's fleet is leased, banks and leasing companies and other organizations, and there are all kinds of leases, Hong Kong lease, Japanese lease, Irish lease.

There's a triple dip Swedish lease I just learned about where you can get very, very low rates of financing, and that's great for the manufacturers because they can sell their aircraft, and it's great for the companies because they don't carry the cost on their books and it makes their cash flow problems a little better, although it creates some other problems financially, but they like it, it works, and it's a permanent feature of today's landscape.

But the actual owner has little or no involvement with the aircraft. Does that give you any concern?

Mr. BRODERICK. Well, yes, it does, for two reasons. The first concern is to make sure that we're doubly vigilant with operators that are operating aircraft that have moved from owner to owner or op-

erator to operator. Leased aircraft sometimes have a complex pedigree compared to airplanes that are purchased and owned from the outset by major companies.

The second concern it gives me is frankly one of just common maintenance programs. If we have lease companies that don't have the skills and understanding to keep a watchful eye over the maintenance program, that shifts a bigger burden not only to the company that's operating the airplane, but to the FAA or the other regulatory authorities around the world to make sure that those shortcomings on the part of the owner are absorbed by additional oversight on the part of the Government.

Mr. OBERSTAR. That's the next step in what I was proceeding to, how the FAA ensures that as aircraft change hands all required work is done and the paperwork trail is maintained intact.

I know that when aircraft are sold the records are supposed to move with that aircraft to the new owner, but I also know from long experience that many of our airline companies have bought aircraft from third world countries, companies operating in third world countries, and have had to undertake enormous maintenance to bring those aircraft up to standards.

Now, something is haywire. If, the foreign airworthiness officials in those countries aren't doing the job they're supposed to do with those aircraft, the manufacturer can't send SWAT teams out to look at airline companies operating in third world countries, so there's this matter of keeping up with the paperwork trail and the huge amount of maintenance that needs to be done. How are you keeping track of that?

Mr. BRODERICK. Well, first of all, you're absolutely right that the records retention problem, we call it, is one that needs an overhaul as well, and these days of burgeoning fleets with all kinds of growth in the leasing industry is something that our regulations don't really contemplate, although they do take care of that, and I'll explain that in a minute.

But we are redoing working with industry, both manufacturers and operators and other Government agencies, our requirements for records retention to see if we can, on the one hand, simplify things and, on the other hand, get a better handle on what records need to go with airplanes for long periods of time.

I am personally very concerned about the leasing issue for a lot of reasons, but the fact of the matter is I'm convinced that with the change in who manufacturers are selling to, we need to develop cooperatively with other governments around the world programs that will allow us to standardize the maintenance on leased aircraft and to recognize where the holes are.

We need to have some kind of facility that probably involves whoever it is that has the money at risk overseeing that contracts and the insurance on the airplane, putting those together with the records that they've got to make sure that maintenance is being done, so that their investment is protected, but also so that passenger safety is protected.

That's something that we've just begun discussions on, and I expect to have a number of discussions with the air-worthiness authorities this June at a meeting we're going to have on the West Coast about the issue.

It's a very complicated issue. It's one that we don't have all the answers to right now.

Mr. OBERSTAR. That's very good to hear. It's one I want to strongly encourage, and it was that type of situation I had in mind with this legislation. It just seems to me that at a certain, point to stop, take stock, and do a comprehensive assessment would be very helpful. Don't you agree?

Mr. BRODERICK. That's right. Conceptually, what I have in mind, and it's very conceptual because we haven't gotten the agreement of other governments and the industry yet, is to set up a system where probably by advisory circular, and it would be voluntary but with a big jaw bone behind it, that said that this is the kind of maintenance program that we would accept in FAA for a Boeing airplane or a Douglas airplane or what have you, have that maintenance program developed in some detail, have the maintenance records centrally located and readily available, and then checked by an interested party.

It could be the manufacturer, it could be a third party, it could even be the FAA. But those records checks and actual spotchecks of the airplanes of themselves could serve the same kind of purpose that we now look at for ramp checks for airplanes that are owned by the airlines themselves.

It's especially important, I think, to develop that trail, and with computers we have the ability to do it, for countries that don't have the kind of airworthiness authorities that we or the Western Europeans or some of our other allies have.

Mr. OBERSTAR. You proceed vigorously with that approach. I think it's important. The next point I want to discuss is the industry panel, in their testimony and also in other discussions of the aging aircraft issue, has suggested that the Airworthiness Assurance Task Force process somehow be institutionalized, sort of regularized, with some sort of permanent committee that puts the chickens in charge of the chicken coop, to put it rather directly. What's your reaction to that idea?

Mr. BRODERICK. Well, I think that we need to have a forum, a public forum, to exchange information with industry on things that are related to airworthiness. We've actually done that.

I don't know that we've every formally institutionalized it, but we do have the Airworthiness Assurance Task Force as a formally constituted Federal advisory committee. It's actually a subcommittee of the R&D committee.

We may do some administrative changing on that, but I have no intention of disbanding that group any time soon. I will hasten to add that around a year ago, or a year and a half ago, we thought that we might need about another year to get all the information together and, if you will, close the book on aging aircraft.

I think we all now recognize that it's a much bigger task than we initially thought, perhaps because of the absence of information that we had, and it's going to take quite a bit longer to do that, so we certainly have no intention of disbanding that group.

We would argue vehemently if the group decided its work was done, because we think the sun isn't even high in the sky yet on this program.

Mr. OBERSTAR. There's no question about that, and I look at the number of aircraft on order and the backlog, and it's great for the manufacturers, not so good for traveling public or air carriers who want to upgrade their fleet for various reasons.

The aging aircraft issue is here, it's with us to stay for a very long time. Now, the industry panel is suggesting, both in their testimony here and in other statements, that they would like the administrator of FAA to require operators to certify that each aircraft is air worthy for operations beyond their fourth "D" check.

Under that concept, as I understand it, the FAA would verify that the maintenance was accomplished and that the agency participated in the inspections of air frame and other parts. What's your reaction to that proposal?

Mr. BRODERICK. My reaction to that is that that sounds like the kind of thing that might come out of the work that we're now in the middle of. I would like to do regulatory changes like that on the basis of the data that we've accumulated and we're in the middle of accumulating over the course of the work on aging aircraft.

I think that when you take a look at the information exchange group that we've got formulated, the corrosion control activities that are just beginning to develop fruit, the fatigue related things that we talked about, the very important human factors aspects of all of this thing, I look at something that in 12 to 18 months is probably going to have developed a body of knowledge that will then enable us to say, okay, what kind of technology-based data base changes do we need to make to our maintenance program?

If that is the kind of thing that we need to do, and I suspect it might be, then we'd move very promptly to requiring it by regulation.

Mr. OBERSTAR. You have addressed the matter, both in your testimony and other forms, the need to upgrade the quality of inspection on the part of FAA to also give them more hands on training on aircraft structures.

First of all, what is the status of that training effort? Are inspectors getting that? I won't ask about the numbers because we've had that testimony from the administrator during our O&M hearings.

Mr. BRODERICK. We have been successful in getting the cooperation of industry to divert some of their resources toward developing these special programs. We've completed one whole series of over 300 classes with the inspectors on the Boeing aircraft. We hope to do a similar thing this year on the Douglas aircraft, and, of course, we'll be working with Airbus and British Aerospace and the others to do similar kinds of activities with them.

So things are working very well, both in corrosion control and fatigue, and we're very pleased at the way not only industry but our own training organization in the FAA is responding to this need.

Mr. OBERSTAR. We certainly need more personnel, we need more training for those personnel, I'm glad your addendum addressed the matter of human factors, and I thought you did a very good job of recognizing the work that needs to be done there.

I'm very, very strongly committed to and agree with a continuous maintenance effort, that has to be an integral part of every maintenance program and of the work of the FAA.

The industry is committed to the manufacturers and the carriers, but at some point somebody has got to look at the aircraft as a system on a holistic basis, and I don't see that emerging out of this whole process that we've been involved with.

That's why I've said in so many remarks and why this legislation addresses the point of a stop, take stock of the aircraft, every system. Don't allow the carrier to defer maintenance, as was suggested in your testimony and subsequent testimony we're going to hear, or they'll put it off, they'll defer it, they know this is coming up, they're going to defer it.

If that happens, the FAA is derelict in its responsibility, the carriers are derelict in their responsibility, the manufacturer would be derelict in its responsibility. That's not going to happen realistically, and that's not the purpose of this legislation.

We want to sustain intensive maintenance on aircraft. We want to sustain intensive oversight. We also want to assure that at some point somebody looks at that aircraft, that high time aircraft, as a system, as a whole system, and starts making judgments about it. That's what I'm looking for you to do.

You talked about liability. Section 607 of the Federal Aviation Act says, "the administrator shall employ inspectors who shall be charged with the duty of"—and it lists two major activities and spells those out—"that the inspectors take such actions as may be necessary to enable the administrator to determine that such aircraft, engines, propellers, appliances, are in safe condition and are properly maintained for operation and air transportation."

How does what we are proposing in this legislation differ from the words that are already in law except that we're saying this should be done at the high time point of an aircraft?

Mr. BRODERICK. I think that the words are very similar. What I can tell you is that——

Mr. OBERSTAR. It's a little used section of the Act, I know.

Mr. BRODERICK. Well, that's right, and I think that that probably was the nub of much of the argument in the Varig case. What the Supreme Court said was that the Federal Aviation Administration, in the years since those words were enacted, has followed a practice of a clearly articulated practice of spotchecking to make sure that industry does what it's also charged with in Title 6, that is of performing the maintenance and operating to the highest level of safety. The key is I suppose, is that work should not be relied upon, that work on the part of the Government should not be relied upon as a guarantee of having passed an inspection, but, in fact, it's the industry that stands behind that.

I think that with the kind of discussion we've had, you don't intend anything different than the kinds of responsibility assignments that have been taking place over the last 30 or 40 years, and we would be happy to work together with your staff to make sure that the legislation, if it moves forward, has appropriate wordsmithing done so that nobody else can make the mistake that we may have made in reading it.

Mr. OBERSTAR. We will continue to consult on that matter, and I just want to recall the words of an inspector in the Miami Flight Standards District Office five years ago in testimony before the Investigations and Oversights Subcommittee in connection with other aspects of maintenance, who said, "we are so understaffed that all we're doing is inspecting paperwork, not engine work."

Mr. BRODERICK. That's exactly the problem that the increase in staffing that we've gotten in the interim period has enabled us to get away from. We are now inspecting aircraft, and next year and the year after we'll be doing more of that.

Mr. OBERSTAR. The point is that the legislation builds on that idea and on that frustration and on that real sense of public responsibility and duty that that very caring and dedicated person expressed, and we're not suggesting in this legislation that the FAA replace the responsibility or in any way absolve the carrier of their primary responsibility, but to supplement and to more intensively carry out its responsibility to the public.

The gentleman from Pennsylvania, Mr. Clinger.

Mr. CLINGER. Thank you, Mr. Chairman. I don't have any questions. I'm delighted to be here and regret that I missed Mr. Broderick's testimony, but I will read it with great interest.

I have an opening statement that I might ask to be submitted.

Mr. OBERSTAR. Without objection, that statement will be included in the record, and the record will show the gentleman had a previous longstanding commitment to other Congressional duty.

[Mr. Clinger's prepared statement follows:]

STATEMENT OF THE HONORABLE WILLIAM F. CLINGER, JR.

Mr. Chairman, until several years ago the subject of aging aircraft was typically discussed in an academic fashion. Experts in industry and government treated it as a research topic that had little—if any immediate bearing on the traveling public.

Events in the last couple of years have dramatically changed that perception. Today manufacturers, carriers, and government alike are working hard to clearly understand the characteristics associated with the aging process of aircraft. There are larger and larger numbers of older aircraft in the world fleets, and it appears that the carriers' demand for aircraft will continue to keep older planes in the fleets of years to come.

Joint industry/government task forces have been working to develop a standardized list of procedures to address many of the known difficulties associated with aging aircraft. I commend them for this effort.

However, an interesting phenomenon has recently developed in the airline industry that raises an additional challenge. More and more, carriers are leasing aircraft in lieu of ownership. The terms of the lease can be brief and it is quite common for an airplane to have flown under different carrier names over a 20 year period. Rapidly changing markets also cause carriers to acquire and dispose of aircraft in a regular fashion.

Such a practice of rapid change of ownership—or lessors—coupled with the increasing expense to maintain older aircraft and to comply with new FAA regulations for inspection and replacement of parts, makes it all the more important to insure that planes are properly maintained and that associated recordkeeping be available.

I look forward to hearing from today's witnesses to discuss aging aircraft, and more importantly, to discuss your bill, Mr. Chairman, which I am happy to cosponsor. To the best of my knowledge, there is no machine more complex, or exposed to extremes in temperature, pressure, and dynamic loads, than today's commercial jet aircraft. With the increasing utilization of aircraft, it is absolutely essential that maintenance be performed on a regular and thorough basis by qualified personnel, and that recordkeeping be able to validate the work.

I wish to thank witnesses for taking time out of their busy schedules to appear before us this morning.

Thank you, Mr. Chairman.

Mr. OBERSTAR. Mr. Broderick, you've been here a long time.

Oh, I'm sorry, Mr. Geren.

Mr. GEREN. I have no questions, Mr. Chairman. Thank you.

Mr. OBERSTAR. You've been here a very long time and responded in your usual thorough, studious and professional manner. We thank you very much.

Mr. BRODERICK. Thank you, Mr. Chairman.

[Mr Broderick's prepared statement appears on page 80.]

Mr. OBERSTAR. Let's proceed to our industry panel, Mr. Robert Doll, Vice President of Engineering and Quality Assurance for United Airlines; Julian May, Senior Vice President for Technical Operations at Delta Airlines; Ben Cosgrove, Senior Vice President, Boeing Commercial Airplane Group; Mr. Dale Warren, Vice President and General Manager for Quality Business and Technology Development at McDonnell Douglas Corporation; and Mr. William Hoover, Executive Vice President of Operations and Safety for the Air Transport Association.

A very impressive gathering of specialists, knowledgeable people in the field of aviation. We're very, very pleased to have you with us, gentleman. Thank you for sharing with us your thoughts on the pending legislation on the broader subject of aging aircraft.

I want to reiterate what I said at the outset. I have, and I think members of this committee who have followed our hearings and followed this issue have, nothing but profound respect for manufacturers and carriers alike and the diligent carrying out of their responsibilities to the traveling public with respect to the maintenance of aircraft.

I think there was a time in the early rush of deregulation and in the frenzy of mergers that occurred in the early years after deregulation when maintenance slipped, both as performed by carriers and the oversight responsibility of the FAA.

But I think it's fair and accurate to say that that situation has long since been corrected, and that is evidenced by the $11 billion or so annually spent by the majors and the nationals and regionals on maintenance, as evidenced by the continuing commitment of manufacturers to the following of their aircraft after sale to make sure that carriers are conducting the kind of maintenance that is necessary, and the cooperative spirit shown by all in the airworthiness task forces assembled in the wake of the Aloha tragedy.

So I want that to be very clear, my respect and appreciation for the job that all of you have done.

TESTIMONY OF ROBERT E. DOLL, VICE PRESIDENT OF ENGINEERING AND QUALITY ASSURANCE, UNITED AIRLINES, ACCOMPANIED BY C. JULIAN MAY, SENIOR VICE PRESIDENT OF TECHNICAL OPERATIONS, DELTA AIRLINES; BENJAMIN A. COSGROVE, SENIOR VICE PRESIDENT, BOEING COMMERCIAL AIRPLANE GROUP; DALE S. WARREN, VICE PRESIDENT AND DEPUTY GENERAL MANAGER FOR QUALITY BUSINESS AND TECHNOLOGY DEVELOPMENT, McDONNELL DOUGLAS CORP.; AND WILLIAM W. HOOVER, EXECUTIVE VICE PRESIDENT, OPERATIONS AND SAFETY, AIR TRANSPORT ASSOCIATION OF AMERICA

Mr. DOLL. Thank you, Mr. Chairman, and good morning, and good morning to the members of the subcommittee.

I'll reintroduce myself. My name is Robert E. Doll, I'm Vice President of Engineering and Quality Assurance for United Airlines.

Since June of 1988, I've chaired the Airworthiness Assurance Task Force, the AATF, which was a task force assembled by the aviation industry and airworthiness authorities to examine repercussions of the tragic failure that struck an Aloha Airlines Boeing 737 aircraft two years ago.

I'll reintroduce the folks at the table. Immediately to my left, C. Julian May, Senior Vice President of Technical Operations for Delta Airlines. To his left, Benjamin A. Cosgrove, Senior Vice President, Boeing Commercial Airplane Group.

Immediately to my right, Dale S. Warren, Vice President and Deputy General Manager for Quality Business and Technology Development, McDonnell Douglas Corporation. To his right, William W. Hoover, Executive Vice President, Operations and Safety, for the Air Transport Association of America.

We appreciate the opportunity to appear today to briefly report on the status of AATF initiatives and importantly to discuss H.R. 3774, the Aging Aircraft Safety Act of 1989.

Mr. Chairman, since we've already submitted a written statement, may I request that that statement be accepted for the record, and I'll abbreviate my oral remarks.

Mr. OBERSTAR. Without objection, so ordered, and your statement will appear in full in the record.

Mr. DOLL. Thank you. Mr. Chairman, you are familiar with the work of the AATF, so we will not belabor the details of its accomplishments. However, as a brief reminder, we've established what we consider is a six-layer safety net for aircraft maintenance.

Specifically, we've reviewed, and the FAA has implemented, instructions and directives for key structural service bulletin airplane modifications compliances underway. We have new industry corrosion control standards that have been established, and mandatory compliance with this program has been proposed by the FAA for Boeing aircraft, and similar programs for other aircraft will follow in due course.

A comprehensive review of all previous structural repairs will be made and measured against upgraded repair standards. Recommended maintenance program guidelines are being updated and

corresponding manuals revised, and an advisory circular incorporating these principles will be issued.

The Supplemental Inspection Program for monitoring aging aircraft, which has been in place for about 10 years, is being updated, incorporating knowledge that has been gained in recent experience, and the system for collecting, analyzing and disseminating maintenance information will be streamlined and modernized in short and long term phases.

Also, I want to stress that the AATF is actively assisting the FAA in their work on human factors and in the research and development of new maintenance inspection techniques.

Mr. Chairman, we appreciate your leadership on aging aircraft issues and the spirit in which H.R. 3774 has been advanced. We think that your support, with or without legislation, would be valuable in setting a program in place to ensure that the industry stays ahead of the aging aircraft problem as additional aircraft types mature.

Here are the program elements that we have in mind. First, we recommend institutionalizing the airworthiness assurance task force process. The FAA administrator should establish a permanent task force under its Transport Airplane Safety Subcommittee, representing Government and industry to review on an annual basis the effectiveness of all previous individual fleet actions.

Such a task force should also establish new fleet level working groups to be initiated for each aircraft type on a schedule approximately 15 years following introduction of the fleet into service. That's for the purpose of reviewing fatigue history, structural service bulletins, corrosion history, and repairs made to that fleet, and to make appropriate recommendations following that review.

We also believe that there is a need to assure that the steps necessary to maintain the airworthiness of an individual aircraft have been taken. Therefore, the AATF recommends action by the FAA administrator to require each operator to certify that each aircraft is air worthy for operations extended past the four "D" check and then at subsequent "D" checks.

The FAA should verify that the operator has maintained the aircraft in accordance with approved maintenance programs and that it has participated as required in the air frame inspections for that aircraft.

The FAA should expand the use of its hands on inspection team to verify the quality of maintenance programs and airplane condition at each operator under its jurisdiction.

All of us should recognize that the actions that we're recommending for the FAA are going to require the FAA inspectors to develop special skills in dealing with symptoms of corrosion and metal fatigue. Accordingly, we recommend that FAA establish a training program designed to furnish FAA inspectors with the skill necessary to conduct the hands on inspections of these conditions.

We believe that the continuous maintenance concept including an effective internal quality audit program is the most effective approach to airworthiness assurance, as it sustains the responsibilities at the operator level. We're concerned, however, that new air carriers, because they have no experience base upon which to vali-

date their quality audit programs, require closer FAA scrutiny than is currently being given.

We recommend that the FAA strengthen the requirements for operators to demonstrate their technical abilities and commitment to airworthiness assurance.

Finally, the foregoing recommendations, if acted upon, can only be effective if FAA is provided the resources to meet the challenges placed before them. As always, we seek your help and the help of this subcommittee in assuring that Congress provides FAA funding and staff resources sufficient to enhance aviation safety and efficiency.

Mr. Chairman and members of the subcommittee, this completes our prepared statement, and we would be happy to respond to your questions at this time. Thank you.

Mr. OBERSTAR. Thank you very much for your statement and for the complete documentation submitted as a supplement thereto. It's very helpful and reflects a great deal of thought and effort put into this matter, which is reflective of a two-year long intensive focus.

I'd like at this point to ask Mr. Warren to describe for us the ongoing programs of McDonnell Douglas on the aging aircraft issue and the types of programs that have been initiated at your facility, and then I'll ask Mr. Cosgrove to address the same issue with respect to Boeing.

Both manufacturers have very fine programs, and I'd like you to describe those for us for the record at this point.

Mr. WARREN. Thank you, Mr. Chairman. We're always happy to talk about the good things we've done.

One of our key activities in aging airplanes is the purchase of a well-used DC-9 a few years ago. This DC-9 was purchased out of service at 66,500 cycles of service used through three different operators. We brought it in plant and subjected it to a simulated continued service for another 160,000 some odd cycles. We did this both by pressurization and also by cyclic loading to spectrum conditions for wing panels to simulate that aspect of continued service as well.

Throughout that period, we monitored the structure just as it would have been done in service, and the airplane was stripped so that it could be extremely well done, so it was a very thorough inspection program.

We learned a few things from that. We saw one family of failures that had never been seen before in any previous testing. On the basis of that, we feel quite confident that the DC-9 can operate very safely for more than 100,000 service cycles.

Another activity that we have underway that's significant is to go check airplane performance in the field. We arrange with operators who have airplanes down for major maintenance, and we send a carefully selected team out to their site and work with them in their facility at whatever hours of day or night is required to do a thorough inspection of the performance of the structure and the processes in service.

We try to focus primarily on the high time airplanes when they're in for heavy maintenance, and we do this both inside the United States and outside. At the last count, I think we had been

through 15 different operator positions and saw something like 17 airplanes.

We do internal reports of those, and we share the results of our findings with the FAA. Another major activity was the supplemental inspection document program. This was initiated quite a few years ago. It incorporated the latest in new technology for damage tolerance and residual strength analysis based on the latest in fracture mechanics and the latest in computing equipment as well as computing programs.

A tremendous amount of test data was generated in order to apply the new technology, and complete books were developed for every one of our major jet airplane fleets. These books detail additional inspections, supplemental inspections, over and above the basic maintenance program, and they're intended primarily to look at the idea that as an airplane gets older, nearing its design life, that additional inspections are done of the key parts to ensure that we have an up front look ahead as to what to expect and what problems might occur.

This process uses the latest in non-destructive inspection techniques and, in general, every one of the inspections, of which there are about 50 per airplane, there are two choices for inspection. One is a visual inspection done at a relatively frequent interval, another one is a more sophisticated inspection using more advanced NDI techniques on a less frequent schedule.

That choice is up to the operator, and that choice is available at each inspection requirement. The key part of that program is to gather all the data on a fleetwide basis around the world, and we analyze that, and we determine the results.

If there are any findings of significance, we work with the FAA, and the anticipation is there will always be an air-worthiness directive issue, as well as a service bulletin. We do this on fleet leaders on a sample basis, and in the event of any complication, the sample becomes 100 percent.

Another major activity is heavy involvement with the AATF, and this involves the five major aspects that you've heard about to date, as well as the improvement to the collection and analysis and dissemination of findings.

Those are the major activities that we have going to assure that the aging airplane problem gets all the focus from our technical ability that is available.

Mr. OBERSTAR. Thank you very much.

Mr. Cosgrove, would you respond to the same question?

Mr. COSGROVE. Yes, Mr. Chairman. We've had similar programs as to McDonnell Douglas since about 1965. We've been purchasing airplanes that might have been in accidents and taking a look at them, if they're high time airplanes, and looking at 707s and 727s.

Recently, we purchased approximately a 20-year-old 747 from JAL and have been testing it. It had 20,000 cycles on it approximately, and we're now at 35,000, so we've almost doubled the lifetime of it.

We purchased a Piedmont aircraft at about 60,000 flights and put another 70,000 flights on it. What we generally see with these aircraft is that when we purchased them they were fairly well taken care of, they didn't have a lot of corrosion in them, and even

after the additional testing that we had on the aircraft, we did not see anything that was unexpected in the aircraft.

Additionally, of course, we have been looking at aircraft since about 1986 and going out to the various airlines and seeing how they do their maintenance and how the aircraft do look.

At this particular time, we've looked at over 83 aircraft all over the world and all the continents and over about 50 airlines, so what we've seen is just exactly how the airlines take care of their aircraft, and, in general, what we've found is that they do take good care of them, although the thing that surprised us was there's a lot of corrosion in the aircraft which is deleterious to fatigue life.

Other things that we've been doing because we see a history of corrosion coming on us and deteriorating the aircraft, in the last six months we've had symposiums in 10 different cities with a whole bunch of airlines. We've had them in Singapore, London, Miami, and had over 650 people who are maintenance people and inspection people taking three-day symposiums to try and enlighten them as to what to look for, when to look, and why to look.

Additionally, we have had classes at the Boeing Company to get the airlines and FAA to take a look at how we look at airplanes, what we know about airplanes, and again to see where to look.

In addition, we are continuing to look at our aircraft and will continue for the next two to four years to look at older aircraft to see how the airlines are doing, because we feel that the FAA is not up to the system yet.

We are now putting into our look at aircraft, deep looks, we're starting to put in the 757 and the 767, even though they only have eight to 10 years of service. We're going to take a look at those.

So our view is that we continue to believe that the airlines are doing a good job of inspecting and maintaining. We do see some that maybe are not as good as they should be, and we're going to be out there looking to make sure that we can bring them up to speed for whatever reason.

Mr. OBERSTAR. I've had opportunity to see both manufacturer operations, and it's a marvel.

I think it's something people ought to have the opportunity to see because the care and the attention paid to every detail is a marvel, and both manufacturers I want to compliment on not just their commitment to the manufacturing process but the follow-up as well.

Each of you has a very deep sense of continuing responsibility to that aircraft once it leaves your shop and goes out into the world.

But one of the things about the static test of aging aircraft, one element that is missing, is the presence of moisture in the various phases of operation: prior to take off, at altitude, and then in descent to landing.

If I recall lately, on a 727 fully loaded with passengers, by the time that it gets up to altitude, it's taken 120 gallons of moisture out from the passengers and the materials brought on board, that all goes up into the hull and precipitates out following the contour of the hull and collects in the bottom and is drained out.

What you've learned, and I don't know what the number is for a DC-9 or MD-80, but I know it's a tremendous amount of liquid throughout the flight of moisture that is gathered and disposed of,

and it's this moisture that has its way of working into interstices on the aircraft that you found that is, I don't want to equate or rate, but one of the most critical factors in the aging of an aircraft that contributes to decay of a critical hull structure.

What are your priorities for dealing with corrosion?

Mr. Warren, let me ask you first.

Mr. WARREN. Well, there are two aspects of that that are important. One is corrosion prevention, and the other one is corrosion inspection during the life of the airplane. We're primarily involved in the prevention aspect in the design and manufacture of the airplane.

We do extensive things in the interior of the fuselage in particular to minimize corrosion, and these are in the form of, first, the selection of alloys which are least sensitive in various protection systems, and there are multi-layer protection systems in a typical fuselage lower section, and, finally, there is a system of dams and drains in a fuselage to ensure best drainage characteristics.

The multi-layer corrosion prevention system includes primer coats that are specially selected, top coats that are specially selected, and in addition to that a protective coating such as LPS-3 is one of the trade names I can remember at this time. This is an oily substance that has a very long life.

As long as those surfaces are not damaged in some way mechanically, the life protection is extremely good, and the airplane that I described, the DC-9 that we bought, which, remember, is the older alloys and the older protection system, we still found virtually no corrosion damage.

Some airplanes are exposed much more than others. If there is damage to the corrosion protection surface, this is a problem. If the airplane doesn't drain well because it has accumulated dirt and such things as this, there are problems. So maintenance is extremely critical. It is very important that proper maintenance takes place throughout the life of the airplane.

Mr. OBERSTAR. Thank you.

Mr. Cosgrove.

Mr. COSGROVE. Like Mr. Warren described, we put coatings on, then we put liquid compounds which are water displacing before we deliver the aircraft, and in addition, of course, there's the maintenance program again which FAA has with the airline which has a repetitive type of a thing now for the first time where there is going to be a program which is mandated where every airline will fundamentally have a minimum standard for corrosion protection in the fleet.

From our standpoint, because there is damage to the aircraft just by hauling cargo around and people will damage paint schemes and so forth, it has to be reinspected and reapplied at a particular interval, and I think that probably the things that we did in what I call the Aging Aircraft Group, or Assurance Group I guess it is now, one of the things was that we put this program in place so that everybody will have this as the standard, not just those airlines that want to keep their assets from corroding to death one way or another.

But there are things that you can't protect against, like people spill things, and you have to be careful, but fundamentally our

view is that the prevention of corrosion and the maintenance of the aircraft against corrosion is probably one of the fundamental things that should be continued on and is very important now.

Mr. OBERSTAR. Mr. Doll, Mr. May, and then Mr. Hoover, where does maintenance line up in the organizational chart of your company? To whom does the senior person responsible for maintenance report in your organizational structure?

Mr. DOLL. He reports to the Executive Vice President for Operations, who reports to the CEO.

Mr. OBERSTAR. To the CEO.

Mr. May.

Mr. MAY. He reports to me, as Senior Vice President of Technical Operations, and I report to the President.

Mr. OBERSTAR. Mr. Hoover, is that generally the case throughout the airline industry?

Mr. HOOVER. Yes, sir, and in the Air Transportation Association, that's the same situation. The Vice President for Engineering and Maintenance reports to me, I report to the President, and we serve a function for the industry through our council activities which are made up of the Vice Presidents of Engineering and Maintenance and serve as a forum for exchange of safety information continuously. The same is true with the Operations function, as well.

Mr. OBERSTAR. To whom does marketing report?

Mr. DOLL. In our organization, that's at an executive VP level also who reports to the CEO. The marketing and finance both report to an executive VP.

Mr. OBERSTAR. They report to an executive vice president? On an organizational chart, is marketing on the same level as maintenance?

Mr. DOLL. Yes.

Mr. OBERSTAR. Mr. May.

Mr. MAY. At Delta, marketing is on the same level as technical operations. Technical operations is engineering, maintenance, quality control, material services, and facilities.

Mr. OBERSTAR. I see.

Mr. MAY. Senior Vice President of Marketing, who reports to the President, as do I.

Mr. DOLL. That's essentially the same. I was referring to the Senior VP of Maintenance Operations is the same level as the marketing.

Mr. OBERSTAR. All right.

Mr. Hoover.

Mr. HOOVER. Marketing is not a role of the Association, so we don't have that function.

Mr. OBERSTAR. You'll take a pass on that one. Okay.

I asked the question because it's important to understand corporate culture on such matters where you rate equivalent responsibilities and how you think about matters if maintenance is going to occupy the high degree of responsibility that it must.

In the case of United Airlines, I think the spending on maintenance is in the range of $900 million and Delta over $600 million. That's a big dollar responsibility, but it's more than that. It's a big responsibility to the traveling public, and I want to know where the corporate thought process is.

Mr. DOLL. Excuse me. I think those figures are probably a year or two old. It's inflated considerably since then.

Mr. OBERSTAR. Yes, they are. The only figures that I have are about a year old.

Mr. DOLL. In our organization for 1990, it's about $1.3 billion, so it's gone up considerably. I think our philosophy is fairly well balanced. We have all operations under one executive VP, finance and marketing under another executive, and they report to CEO, who is Chairman of the Board, so that I would say that in my experience it's very well balanced and always the number one objective.

Mr. OBERSTAR. Thank you.

Mr. May, do you have any comment about that?

Mr. MAY. Yes, we have six divisions within the company. Three report to the CEO as finance and legal, and the rest report to the president.

Mr. OBERSTAR. Thank you.

Mr. Lightfoot.

Mr. LIGHTFOOT. Thank you, Mr. Chairman.

Thank you, gentlemen, for being here today. In a recent visit we made to Mr. Warren's company and also to Mr. Doll's maintenance facility, it appeared on this corrosion issue that we seemed to find a lot of it centered pretty much in the galley area, and I'm not convinced that that isn't more of a statement on airline food than it is on corrosion problems.

Be that as it may, is it a fair statement, considering Boeing, McDonnell Douglas, anybody that's building airplanes, were using the latest technology we have available to us for corrosion, that the elimination of corrosion really is a direct function of maintenance? Is that a fair statement?

Mr. COSGROVE. Well, you know, we don't think we're ever going to get rid of corrosion. We put more coatings on and so forth down the line, but the airline is going to have to inspect that airplane to make sure there isn't corrosion that's starting to eat through the fuselage. Okay? There's no question, and that's the way we tend to direct them.

Even to the extent that the committee that put forth all these new AD notes and new service bulletins for the first time because we got to the airlines together, would end up by saying, hey, look over in that corner, don't look at the wall. But we know from experience after 20 years that you can look over here and you probably find corrosion. Put your resources there rather than spread them all over. But an airline must inspect and maintain against corrosion.

Mr. WARREN. I agree with that 100 percent. There needs to be a good preventative program, and there needs to be a quality continuing maintenance program.

Mr. LIGHTFOOT. What I was getting to, I guess we agree that if there's good maintenance, the corrosion problems are less. We've got, what, 1,200 inspections that we need to make on old aircraft, somewhere in that ball park?

Number one, can the FAA do it under this bill, and, if not, is allowing the airlines to do that with the FAA supervision a better route to follow, or a combination of the two? Where do you fall in on that argument?

Mr. COSGROVE. Well, at least at Boeing, and I think most people agree with us, is that the people that are really in the front line are the inspectors and the mechanics at the airline, given the proper direction as to where to look and when to look and so forth. These are the people that we're highly dependent upon. These are the people that are going to keep those airplanes safe with the help of other people.

Our view is simply this, that the airline is going to do that job and do it well, and there may be some people that are misguided or don't have enough information, but the FAA, in a survey looking at some airplanes and talking to people in the airlines, should quickly determine whether or not they've got the proper program to maintain aircraft safely.

We believe the oversight function of the FAA is highly important, but the real talent lies there in the inspectors and in the mechanics at the airlines, well-trained and experienced.

Mr. DOLL. We find it hard to contemplate how the FAA would handle those 1,200 airplanes plus a significant number that are approaching whatever that design age might be. We would think that there would have to be a significant grounding everywhere of the aircraft if the legislation as proposed was passed and required a one-year inspection period.

I tend to agree with Mr. Broderick's original estimate, that it would take at least five years to get up to speed. The airline maintenance operations are all expanding. I know that we've gone from between 9,000 and 10,000 employees four years ago to approximately 14,000 now, and we're on our way to 17,000, and we're absorbing a good portion of the people who are being trained as A&P mechanics, and they're the ones that become our inspectors.

We feel very strongly, and I'm not speaking just for United Airlines, I'm talking about the airline community, in general, that we have the responsibility for airworthiness, and we want to maintain that responsibility solidly in our camp.

So I question that with competitive salary structures, with the need for training, the need for recruiting, the need for the original licensing period, that the FAA could get on top of this inspection process without a serious disruption to air traffic in the United States.

Mr. LIGHTFOOT. I think we've got a very safe and a very sound system, and, of course, the point of legislation is to try and improve it and make it more so as far as that goes, and having ridden on both of you gentlemen's airline, of course, Mr. Doll, I'm in a position I use your airline at least twice a week, and having had an opportunity to go through your maintenance facility, I get on there and go right to sleep, very confident that everything's where it should be.

But that's a good feeling to have when you get on a commercial carrier, to know that the latest state-of-the-art is being used and so on. With the inspection that's being proposed, the one-time FAA inspection, it would appear to me that an aircraft would have to be out of service for a considerable length of time to undergo that particular inspection.

Is there any way that the same thing could be achieved during your normal routine maintenance, your normal inspections, and so

on? When you've got an aircraft in, are you going to add the new wind shear equipment to it? There are a lot of things coming down the road you're going to have to do, part of your normal maintenance program.

I guess maybe to get the chicken ahead of the egg here or the other way around, whichever way you want to look at it, is that going to be a problem from the carrier's perspective if an aircraft is going to be down for a extended period of time just for an inspection, when maybe you could incorporate that in with some other maintenance?

Mr. DOLL. Well, basically, we think that our normal preventive maintenance sequence really does handle the intent of an assurance at some point that an aircraft has been essentially holistically considered, as the Chairman recommended before.

Just a very practical matter, if the inspection as we read the proposed legislation would require essentially a complete tear-down to bare metal of the aircraft, and there may be some other things that could be incorporated at that time, but the primary focus would have to be inspection, and we haven't really done a lot of sharp pencil work as to how long that would take, but I would have to say at least three weeks.

Mr. MAY. Based on what we do now with L-1011s, at all heavy visits, which is about every four years, we put them on the ground for about 30 days now, and that does not take the whole airplane down to bare metal in every section of the airplane. There are some sections of the airplane that are taken down.

My guess would be on an L-1011 it would take twice that long and probably around 50,000 to 60,000 manhours. We are spending 30,000 to 35,000 now. That's not just maintenance. That's some modifications as well. But my guess is it would probably take at least six weeks and probably eight weeks to carry a 1011 down to bare metal 100 percent.

Mr. LIGHTFOOT. What does that translate into in dollars, 35,000 hours or whatever?

Mr. MAY. Around probably $2.5 million to $3 million. That's just for labor. That doesn't include material.

Mr. LIGHTFOOT. You've still got to go the shop and get the parts?

Mr. MAY. Yes, sir. Now, FAA is available and does watch us as we do what we do today, and in our hangars every day we have from two to four airplanes that are undergoing heavy maintenance, and in many areas of those airplanes, they are being torn down to bare metal. We are inspecting for corrosion, we are applying corrosion prevention systems, and we are doing modifications, so there is ample opportunity to see what the airplanes look like.

Mr. LIGHTFOOT. We're talking about corrosion. Of course, metal fatigue is another part of the whole issue. With some of these new non-destructive evaluation methods that are coming on line, do we need some more R&D money in that area possibly to come up with some systems that are faster that work better or are more thorough, or is that moving along in a relatively good fashion? What's your feeling on that?

Mr. DOLL. I think that at the moment the question is to get a good payback on the money that's been allocated. As a matter of fact, there's a meeting going on right now at the ATA headquar-

ters that will report to the AATF tomorrow where we have a small group working with the FAA to look at the priorities they've set and to try to come up with the best way that we can to assure transfer of technology from one department of the Government to the other.

I think Mr. Broderick mentioned the Navy corrosion program. We've had a corrosion team from the Navy come out and visit United and look at our procedures and make some cross recommendations and so forth.

Basically, we are concerned about transfer of technology between NASA, FAA, DOD and also from private industry. We are concerned about how to best use the NDI center at Ames, for example. Carnegie-Mellon has entered in from another direction. That's essentially how to use robotics in these inspection methods.

There's an awful lot of activity going on. I think the question right now is how to spend the money that's been allocated to our best advantage.

Mr. COSGROVE. We see the same thing. We see a lot of interest from the private industry into this particular area. Like Bob talked about, robotics from Carnegie-Mellon. As being part of the FAA RD&E committee, we're starting to see that money get spent now, and I don't think we need any more impetus. Everybody recognizes that anything we can do to alleviate the burden of tediousness on the mechanic we ought to go ahead for.

Mr. DOLL. We do have a separate task group under the AATF that's dedicated to R&D and is chaired by Sam Venneri from NASA, who actively sits on our steering committee. I think we've done some good work in the last year, and I think we're starting to come to a head to help the FAA put together their R&D program for the next years, and that will be done within the next week or two.

Mr. LIGHTFOOT. Okay.

Thank you, gentlemen.

Thank you, Mr. Chairman.

Mr. OBERSTAR. Mr. Laughlin.

Mr. LAUGHLIN. Thank you, Mr. Chairman.

Mr. Doll and Mr. Warren, I want to echo what the Chairman and Mr. Lightfoot said earlier. I was most impressed, when we visited your company facilities, with your commitment to safety and maintenance, and as a member of this subcommittee, I very much appreciate the leadership that you have given in that area.

Unfortunately, Mr. Cosgrove and Mr. May, I have not been to your facilities, but I have flown on your airplanes, and it seems like they try to meet those standards that we witnessed. Certainly, you are recognized as leaders in those areas.

Mr. Doll, I want to begin by directing your attention to page 9 near the end of your testimony. You suggested that the FAA strengthen the requirements that new operators demonstrate their technical abilities and conduct to airworthiness assurance, and I want to ask you a series of questions on that.

First, is there a reason to limit this requirement to new operators?

Mr. DOLL. No, not really.

Mr. LAUGHLIN. Second, could you elaborate on what would be done to meet the requirement, and would the airline have to establish an organization that would be responsible for quality assurance?

Mr. DOLL. We think that the current requirement for a chief inspector and a chief mechanic really needs to be supplemented by somebody who is in charge of technical matters including quality assurance. We think that an operator should, at the very minimum, have enough technical expertise to be able to evaluate service bulletins as they come from the manufacturers and evaluate ADs as they come from the FAA.

Mr. LAUGHLIN. Third, where should that organization reside within an airline, and to whom should it report? In a major carrier, how big would this organization be? By that, how much staff and with what expertise would be needed?

Mr. DOLL. In our airline, and I feel very comfortable with it, as I mentioned before, I report to the Senior Vice President of Maintenance Operations with clearcut instructions that if I have a problem that I think is being resolved in the direction of business expediency rather than safety that I go up the chain all the way to the Chairman of the Board.

That's been reinforced by my boss and by his boss, so I feel very comfortable with that, and I don't think it's really any different in Julian's organization.

My organization, in round numbers, is about 250 people. I'm responsible for all of the engineering standards and procedures, we operate a maintenance program review board, we operate an AD and regulatory change review board to make sure that the technical services operations have interpreted these things properly, and then we also do the quality assurance.

We have at United approximately 55 inspectors who are responsible for assuring quality, doing audits, at all station operations and base operations. We have a whole separate inspection organization that looks at the day-to-day production work.

Mr. LAUGHLIN. Would any of the other gentlemen care to comment further, or do you differ in any way with Mr. Doll's testimony on those points?

Mr. MAY. Not particularly different, but in my technical operations division, we have about 9,000 people, and we have about 6,700 in maintenance, and we have about 800 in inspection. That directly answers, I think, the question you asked about staff. Both maintenance and inspection report to me, and I, in turn, report to the president.

Mr. LAUGHLIN. Mr. Doll, have you or will you petition the FAA to implement the recommendations for stricter requirements that you testified to earlier today?

Mr. DOLL. Yes, we will, through the AATF.

Mr. LAUGHLIN. Is that something we can expect to see in the near future, or do you have a target date on that?

Mr. DOLL. Well, we've already discussed it. In fact, we have a meeting tomorrow where I'm sure we'll discuss it in a very lively way.

Mr. LAUGHLIN. It sounds like you all are moving ahead.

Mr. DOLL. Yes, we've tried to do that for the last two years.

Mr. LAUGHLIN. More than half the airliners in this country are leased. Recently, I was on one that is not represented in this hearing, and it really was driven home. The plaque inside the cabin said, "leased and operated by," and it named the U.S. carrier, and then below that, "owned by Mitsubishi Bank, Tokyo, Japan."

I see no problem with leasing, per se, but I wonder if there are adequate checks to ensure that all work is being accomplished as aircraft change hands, and is there any opportunity for an aircraft to slip through the cracks as it changes hands extensively?

Mr. DOLL. It looks like I've been deferred to here.

Do you want to go?

Mr. MAY. Well, we concern ourselves with that also. We've seen aircraft over a 10-year period be in seven different hands. You wonder whether the airline that's got it today is doing the proper maintenance.

We do see in many cases today where the leasing companies are beginning to recognize the fact that they have a fairly large asset in their hands and are starting to do their own maintenance. In other words, the leasing companies are now beginning to set up maintenance bases for themselves to take care of their own aircraft.

But it is a question as to really how well some of that maintenance is being done at the moment, and that's one of the reasons we want the FAA to get in there and do the oversight. We ourselves go into third party maintenance phases, Boeing does, and take a look at aircraft and make sure that the maintenance is being done in the proper manner.

But it has to be looked at it. It does have to be looked at, because there's a different feeling, in our view, that an airplane moving from airline to airline, you may not have the ownership that you would like to have the people feel as they take a look at the airplane.

Now, leasing is done in many, many ways. Major airlines lease, but they lease from themselves, so they really feel they own their aircraft, so there's a difference in leasing.

Mr. DOLL. We have a mix. I should know from all the articles that have been in the Wall Street Journal lately as to how much of the fleet United owns. The figure that sticks in my mind is roughly about two-thirds is owned, and we have a fairly, I think, unusually high proportion of owned airplanes in our fleet. We lease others for obvious financial reasons.

I think the problem comes or the potential for a problem comes when you have a lease company who owns the airplane, a second party who operates the airplane, and a third party who maintains it.

It's fairly easy to not accept, even though the operator is responsible for the airworthiness of the airplane, the third party maintainer is not necessarily responsible or doesn't always feel a responsibility to handle all the non-routine things that he finds when he's doing the maintenance he's contracted for, and I think those are some areas where the FAA has to have some resources applied to tighten up on that process.

You just can't generalize about the leased airplanes. There are some very large companies, like GPA, and I think that may be who

Ben was alluding to, who are setting up maintenance operations and really have become aware that it's in their best financial interest to maintain the airplanes, aside from a safety point of view.

But as in any other business, there are people who will just turn the airplane and collect the money, and those are the ones that we have to be careful about.

We are working extensively, and this is not an AATF effort, but ATA/FAA, on the whole question of record requirements and essentially the pedigree of an aircraft and its component parts, and it's a system that needs review as the nature of the business changes and you do have a shift to significant fleets being owned by third parties.

Mr. LAUGHLIN. Within Delta or United's operation, is there any difference in treatment of the maintenance procedures on your leased or company-owned airplanes? And as a second part to that, when you lease an airplane from someone other than your own company, I think I understand a little bit about the mechanics of that, but I am talking about when you lease from some other entity other than one of your company-owned entities; do you put that plane through any particular maintenance checks before you put it into use?

Mr. MAY. I'll speak to that as far as Delta is concerned. Probably around 40 percent of our airplanes are leased. Most of them are sold at the time of delivery from the factory to a company and leased to Delta, some we have owned previously and we've sold and leased back, and some airplanes we have leased from other sources.

But the main thing that gets to the point, I think, that you are suggesting, is what we've experienced when we bought used airplanes, and when that occurs, or the same thing could occur when you lease an airplane that's been previously operated by someone else, is that you need to thoroughly go through that airplane to be sure you know exactly what maintenance program it was on in minute detail, and then, in Delta's case, we put everything on Delta's maintenance program.

The Western merger was a good case in point. We brought in 90 some odd airplanes, but each of those were what we call put through a zero check in the hangar which did everything necessary to put them at a level on the Delta maintenance program that was a known level, and from then on we continued it just like every other airplane in the Delta fleet, and all airplanes in the Delta fleet are exactly the same, you know, given the same type engine, same system, and so forth.

There's one case I think when we probably would not do that, and that's when we leased an airplane for a short term from an owner who wanted it kept under his own maintenance program. He was going to deliver it somebody else a year later, and he wanted it under a program that he knew, and this next operator was going to be able to use. That has happened on occasion.

Mr. DOLL. I would essentially say we handle it the same way. I'm not sure that anybody in our maintenance division, including myself, could even tell you which tail numbers are leased and which aren't. They all look alike. They have the same colors on them.

We do not handle airplanes differently. I think the question of how would we handle an airplane coming into the fleet, we've obviously purchased quite a few used airplanes lately. The major acquisition was the Pan Am Pacific acquisition. We acquired several Pan Am airplanes, and I think we've subsequently sold a few to Julian.

The 1011s came from the Pacific operation for Pan Am, and they really weren't the right airplanes for that. Actually, Pan Am was using them in South America, and the Delta lent itself to that kind of airplane more than it did the Pacific.

At any rate, we do as thorough a maintenance check, and if we can't verify that certain airworthiness directives and service bulletins that we would like to have seen done on that airplane were done, then we go and essentially do some portion of a "D" check to get the airplane on our maintenance program and to baseline it so that we can continue it in our maintenance program.

Mr. COSGROVE. We saw one airline, not in the United States, that bought three 727s, one from each different operator someplace, like United or something like that, and they had them on three different maintenance programs, which just scared the heck out of us, but they didn't have time. They were just doing them at different times.

Mr. LAUGHLIN. I was getting ready to ask you and Mr. Warren this question along those lines. Within your company, when a plane goes through the history of six or seven different lease operators or carriers, do you get reports from anyone along the line that this plane that you manufactured has changed hands, and do you monitor in any way the maintenance or the standards of maintenance that is being performed on that plane?

Mr. COSGROVE. We know where every aircraft is and how many hands it's been through, and we can track it from the day it left the factory to today as to who has had it, who has maintained it, and so forth down the line.

We do not keep track of the maintenance records one way or another, and this is why, though, we are going out as a company and looking at the various high time aircraft in various areas and having gone through various maintenance programs just to find out what the heck is going on, but we do not track the maintenance.

We know where the aircraft are because we are constantly sending out service bulletins and messages to the owner of those aircraft telling him to inspect here and inspect there, so we know where the aircraft are.

Mr. WARREN. I would answer yes, that we also know where every airplane is, and we have a certain informal level of reporting back on the maintenance via our field service representatives.

We have field service representatives that are on site and cognizant over almost all the airplanes, and they're close enough to touch them on a semi-regular basis, and we get reports back from them as to the quality of maintenance that we see.

There's a broader aspect to the questions you're asking that I think is important, and I would like to see this committee get involved in the issue of the fact that our real concern is safety and

our real concern is safety on a worldwide basis, not just within the territorial boundaries of the United States.

We have a tremendous amount of cooperation and team work going with those organizations which are member of the AATF, but there are other countries where we do not have involvement, and some attention needs to be given to that. The problems show up in the leasing as airplanes are transferred, and the worst case is when an airplane is transferred from somewhere outside the United States to somewhere inside the United States.

The difficulties associated with bringing those records up to a zero check, as Julian as cited, are extremely severe. It takes a tremendous amount of work, and there's great difficulty in ensuring that they are done completely and thoroughly.

FAA does a good job of monitoring that when it is done, but it still is a big chore, and whenever there's a big chore, there's a certain amount of risk involved. You also have to recognize that if there is that tremendous transition, there may also be some safety hazard associated with the maintenance that went on while the airplane was outside of the United States.

Sooner or later we must recognize that our world is shrinking because of our industry, and we need to have a very tight focus on what goes on outside the United States as much as possible.

Mr. LAUGHLIN. I am not quite so worried when that plane has been transferred around several times and gets into the Delta or United operation as I am when that plane has been transferred around numerous times and ends up in a carrier's hands that does not have your standards of maintenance; and I am wondering should the FAA be required or do they have requirements that at some transfer point that plane is checked to ensure that the maintenance standards have been maintained?

Because as you point out, Mr. Warren, the world is shrinking, our planes are being transferred a lot more, a lot more Americans are getting on them off in distant lands, and there is where my concern comes from.

Mr. COSGROVE. We've often thought that before an aircraft be transferred into the United States Registry it have some sort of an inspection by somebody or something to find out what's happening to it.

Even to that extent, maybe even before it's transferred outside the United States to other hands. You are dependent upon the airline doing their job. Sometimes you find that maybe though the records aren't kept as well outside, as Dale says, there might be a thought here that maybe there should be some sort of inspection before it comes into the United States Registry.

I know, like Julian said, every time he catches an airplane that's going to come in that's got his name on it, he's going to zero time that thing.

Mr. OBERSTAR. If the gentleman will yield, you said someone should conduct that inspection. Who should that be?

Mr. MAY. May I respond to that?

Mr. OBERSTAR. Yes.

Mr. MAY. Certainly, if we were to bring an airplane in, whether we bought an airplane from a foreign operator or whether it had been leased by a foreign operator, we would be sure that that air-

plane meets the standards and the quality of the requirements of the FAA and Delta Airlines. We're the certificate holder, and we're the operator, and it's our responsibility to do that.

Mr. OBERSTAR. But when it comes into Delta or United's hands is not a big worry, to me. The big worry is when it gets in the hands of some of the other carriers or operators.

Mr. MAY. But they are still responsible as the operator and the certificate holder. They are responsible for that.

Mr. OBERSTAR. But some of these don't have the facilities that you have, and my concern is should the FAA be involved at that transfer point. How do we ensure that a plane is brought up to the standards that you're testifying that both of your companies do?

Mr. MAY. Well, as the operator and the certificate holder, he has that responsibility. Now, he can have it done, he can send it out to a fix base operator, he can send it to a repair station, he could hire Boeing, he could hire Douglas, he could hire Delta or United, to be sure that it does come up to the FAA requirements, but it's his responsibility to do it. FAA is responsible for the oversight to see that he does do it, so I think there's joint responsibility.

Mr. DOLL. Mr. Chairman.

Mr. OBERSTAR. Go ahead, Mr. Doll.

Mr. DOLL. I guess what we're seeing is that right now the operator very clearly has that responsibility, and the FAA has the clear responsibility to enforce it, and if that's not being done, then the system as it exists now is breaking down, and just requiring one more level I don't think is going to fix the basic problem.

Mr. LAUGHLIN. Thank each of you very much.

Thank you, Mr. Chairman.

Mr. OBERSTAR. The gentleman's concern is underscored by the fact that half of all Americans traveling abroad travel on some other carrier than a U.S. firm, and our concern has to be for our fellow citizens traveling abroad that the carrier they select, the foreign carrier, have a maintenance program that meets U.S. standards, because, after all, it's their lives that we're concerned about.

Mr. DOLL. Well, I think you're well aware that there has been a cooperative effort for several years on the part of the JAA, the Joint Airworthiness Authority in Europe, and the FAA to bring the standards together. I think that just the AATF is one small example of that.

I know that Mr. Broderick has been very active in promoting this whole idea with ICAO to see what we can do to bring some of the other folks in. We have a major joint FAA/JAA meeting coming up in San Francisco in June, and we'll have an AATF meeting in conjunction with that.

I think those are the things that need to be reinforced, and I know that if I'm going to be flying from one strange country to another I would just as soon be under CAA authority or DGAC or something like that.

Mr. OBERSTAR. As Mr. Cosgrove said, however, the concern runs to those countries not members of the AATF, and that's where the problem is. I don't want to persist, and I do want to recognize the gentleman from Tennessee.

Mr. DUNCAN. Thank you, Mr. Chairman.

I wasn't here for the first part, but we had a witness last fall in these hearing, and I'm sorry I don't remember who that was, but the witness said that there was almost no relationship between the age of aircraft and aircraft safety.

I know all air crashes and, all of us would agree, even one crash is a terrible thing or too many, but has there been any expert who has said that there is a direct relationship between the age of aircraft and airline safety that you know of?

Mr. COSGROVE. No, I wasn't at the hearing, but I would have said the same thing, that as far as I'm concerned, there's no relationship between safety and age. It's really in how you maintain your aircraft. We've looked at aircraft that are 25 years old and they look like they just came out of the factory, and we've seen some aircraft that had been out of the factory for six years and they look like they're 70 years old.

So it's really, in our view, taking care of the airplane, just like you taking care of your automobile. You can walk down any road in the United States and you can see some cars that are rusted to death and some that are 40 or 50 years old and look like they're brand new, so it's that issue with us.

Mr. DUNCAN. And you do have fairly new airplanes that are involved in crashes for whatever reason. Correct?

Mr. COSGROVE. Yes, absolutely. Absolutely. We had a case where we had an aircraft that was a third of the lifetime that was even worse and had a worse crash, so it's just a matter of how you take care of it. It's not time or cycles.

Mr. DUNCAN. What I'm trying to find out is, if there's a problem there, then let's do something about it, but if there's not a problem there, then we have a lot of other things that we can deal with, and I wonder, you know, if this really is a problem or if we're not making a mountain out of a molehill here.

We have a paper here that shows that the average age of the American airline fleet is 13 years old. Would that be considered old by any of you, and is that significantly different than it was, say, 10 years ago? What would have been the average age in 1980? Would any of you know?

Mr. COSGROVE. It would have been younger, but what you'll really find with time is that you'll find these fleets getting younger because we're building new aircraft as fast as we can and the old aircraft are just hanging there, so the larger percentage of the fleet are now going to be new aircraft and younger aircraft, so you'll see the age start going down.

But the number of aircraft, there's maybe about 1,200 or 1,300 aircraft very shortly that are going to be over 20 years old, and they're not going to go out of that fleet very fast because as long as the traveling public is increasing at about 5 or 6 percent a year, we're barely keeping up delivering new airplanes to take more passengers.

So you're going to hang onto aircraft considerably longer than we have in the past, but I would also refer you back to my friend Mr. Warren's airplanes built in 1933, 1935, 1936, which are still flying all around the world, and those are DC-3s, and they hang in there pretty good, so you can do it.

Mr. DUNCAN. I believe Mr. Doll wants to say something.

Mr. DOLL. Yes, Mr. Duncan. It really is a question of productivity, and that's why I think that the economic design life issue is one that really has nothing to do with technical goodness.

When these airplanes were designed in the early 1960s, mid-1960s, not only were the designers looking at fatigue considerations, but the marketing people were looking at essentially what kind of new technical innovations might come along that would displace the airplane.

A 727 that was built in 1965 flies at essentially the same speed as a 757 that just came into service in 1980. They essentially consume about the same amount of fuel; at least, at the cost of fuel today, there really isn't a big difference between the two-engine and the three-engine airplane in terms of productivity.

If fuel goes up, you'll see economic design life coming into effect, but those airplanes are still good. They still travel at mach .8, and they'll get you from here to there at about the same speed no matter which one you're on.

So I think that's more the issue, that plus the maintenance costs. We are looking now at airplanes that have increased in terms of out-of-service time from 14 days to 28 days. That would be an example for older 727s and 737s. You double the time in dock, you double the amount of maintenance manhours, there probably is some reliability impact over airplanes with the older system, they may tend to leak more at the gate, so those are the kind of factors that will take it out of service.

It's just like a 1956 T-Bird. You can maintain it as long as you want to.

Mr. DUNCAN. I have a question. You referred two or three times to the economic design life, and I wonder about that. We have a briefing paper that says the average economic design life is 20 years.

If we enact legislation that says that all of these airplanes are to be inspected during the last year of their economic design life, are there rules in place? My understanding is, and it may be wrong, that the manufacturer establishes the economic design life. What would keep the manufacturer from increasing the economic design life? Of course, with technological improvements, I would assume that the economic design life would increase slowly over time.

Mr. WARREN. I'd like to comment on the term "economic design life." I believe that I can claim to have been in the conversation when that term was invented, and it has been grossly misinterpreted many times since then.

In days gone by, we used to talk about the design of an airplane, and, as Bob said, we would look at the idea of how long was this technology likely to be in service, like there was no sense designing something that would last 50 years that was going to be outdated in five.

The guidelines during the jet age have typically been 20 years as the likely time, and the expectation at that time was in 20 years there would be a new technology, and the airplanes would be out of service for some technological obsolescence.

From the 20 years, then we would determine typically the number of flights per year is 3,000, the number of hours per flight, depending upon what kind of an airplane it is, would lead us to the

number of hours. Now, the critical thing in designing airplane fatigue is generally the number of flight cycles, so the number of flights really is the important thing.

We began to get worried about 15 years ago that there would be some inappropriate action taken in a semi-arbitrary way to put airplanes on the ground because they exceeded their design life, so we began looking at other ways to talk about that design life.

First, we thought we'd talk about it as a design goal, and finally we decided that the best thing to do was to call it an economic design life because the real decision should be based on the economics.

If you replace enough parts on an air frame, it ought to last forever. Now, the question is, how many parts do you have to replace, and how much does it cost? Does it cost more to replace all those parts, or are you better off to buy a new airplane? That's a purely economic decision.

That assumes, of course, that maintenance is being done on schedule and that parts that need to be replaced are replaced. So out that grew this term "economic design life." Now, really there's no way for any designer to sit down and say it will become uneconomical to operate this airplane in 20 years.

Mr. DUNCAN. It depends on the number of flights and hours and maintenance.

Mr. WARREN. Well, and it depends on the economic situation for the operator who has the airplane at the time, and it depends upon what technology is knocking on the door at that time.

We recently worked with a new engine which is substantially more efficient than current engines, but its time has not come because it is quite expensive and the trade off is against the cost of fuel, and the cost of fuel doesn't justify this new technology engine. But one day it will.

The same thing is true when you go back to 20 years ago and think about the various technologies that we incorporated at that time. So the right way to think about this is when the operating economics of performing the proper maintenance justifies doing that maintenance, then the airplane should be maintained, and that should be an operator decision at the time.

If it is not economical to operate the airplane, that's different, and every operator has a different situation in terms of availability of cash, availability of the skilled manpower to do the various maintenance operations, so there are many aspects of this.

Another thing that came up is, well, maybe we could talk about some simple number about years or some simple number about hours or some simple number about flights. To get a good appreciation for this, two stories I could pass on is that some years ago the Blue Angels flew A-4s, and they also operated A-4s in training missions at that time.

They discovered quite soon that fatigue cracking occurred in one of those applications in the aft fuselage due to high tail loads associated with maneuvers is the way I remember it. Cracking occurred earliest in the wings during training operations, and I assume this would be hard landings and carrier simulation.

So what they began to do is to take the wings and the fuselage apart and mix them so that they could take the least used fuselage

from training operations, a least used wing from the Blue Angels, and they'd get an airplane that lasted longer.

The way the Air Force handles this is they track individual planes. Their utilization is highly dependent upon gust turbulence and maneuver encounters at low altitudes, so for low altitude operations it's appropriate to track each plane individually, and there is a computer program that the Air Force uses, and they will take an airplane out of critical service, where it has a highly intensive loading environment, and put it into a less intensive loading environment.

Now, that's practical when you talk about the Navy operations and the Air Force operations. It's not very practical when you talk about a leased airplane that is maybe used over a period of time by several different operators.

There is no simplistic way. Now, our logic in our proposal for our recommendation to the committee is that there ought to be a closer look at what goes on at 15 years, and we arrived at that number by taking three-quarters of the 20-year number that we started with in the very beginning, and what we suggest should happen at that time is not some specific hard action, like put the airplane down and do something within a year, but rather have a highly qualified industry/Government committee review the situation and recommend some actions to take place in the near term.

Now, that doesn't mean within a year. It maybe means five years, it maybe means 15 years, but a highly qualified team to review the airplanes as they've gone through the fleet, as they've gone up for that first 15 years, and make recommendations as to what should happen next.

Mr. DUNCAN. We all have a tendency to sensationalize today, and I'm a little bit concerned that hearing like this could unnecessarily scare the traveling public, and I'm wondering if, you know, we say, well, all of these airplanes are getting older, and the average age is going up all the time, and so forth, I wonder if any of you would care to comment is airline travel safer today than it was a few years ago?

What I'm thinking about is this. I don't know if you have comparable statistics, but a few days ago in our Surface Transportation Subcommittee of this same committee, the National Highway Safety people testified that the number of deaths per 100 million miles traveled on the highways had gone way down from 5.2 to around 2, and in many states, such as California, they're hoping to get it down to 1.8.

Once again, I'll say any death is terrible, but apparently great improvements have been made over the last 30 or 40 years in highway safety. I'm wondering, do you have similar statistics for the airline industry? What is the situation there?

Mr. COSGROVE. We sure do. Beginning in 1960, when the jet airplanes came in, the rate of deaths per 100,000 landings, we call it landings, or some number like that, is probably about 30 or 40 times better today than it was in 1960.

But to give you some kind of data, you know, in 1988, 46,000 people died in the United States in automobile deaths, and there was 285 airline deaths in the United States, and we got more lines

of type than anybody did for the 285. We don't want to kill anybody either, but aircraft flying is very safe.

Mr. DUNCAN. You're saying it's 30 or 40 times safer today than it was in 1960?

Mr. COSGROVE. Right. Absolutely.

Mr. DUNCAN. Well, let me ask you this. You know, I'm not opposed to this legislation. I may end up voting for it if it's necessary. I just ask you, would any of you care to comment, do you think this legislation is needed, that it is necessary?

What would be done differently that we're not already doing through your inspections by your companies or that the FAA is doing? Is this really progressive or needed legislation? Would you all vote for it if you were members of Congress?

Mr. OBERSTAR. It's a conflict of interest to vote for or against it.

Mr. COSGROVE. Let me express it from Boeing's standpoint. We believe that there is a system set up in the United States to keep aircraft safe, and it belongs to the manufacturer, it belongs to the airline, and it belongs to the FAA.

We've also stated a number of time that our view is we don't need more legislation, but we do agree that we had a false start at Aloha, and there was something wrong. We have no argument about that.

We do believe in our view that the oversight function that has been in existence since about 1978 to now was going after the wrong thing. They were going after paper rather than looking at airplanes, and we want that changed.

We, Boeing, and I know Douglas is doing it, are looking at airplanes because we don't think that the FAA has got the manpower or the experience to go after looking at airplanes today and ensure that a small airline or a leasing company or whatever it is is doing the right thing.

I am not sure I'm very cognizant about the legislation, but anything that we can do to bring up the FAA not to looking at every airplane but doing an audit function to ensure that there are no charlatans out there, we would accept it one way or another.

Mr. DUNCAN. Mr. May.

Mr. MAY. Yes. If this bill were to pass, as I understand it, I don't know how we would implement it. In some years, we have bought 25 or 30 airplanes. If that were the 19th year that we had to inspect those airplanes down to bare metal in addition to our regular maintenance program that we are carrying on with other fleet of airplanes, which involves heavy maintenance, about three or four per month on top of that, I don't know how we would handle it from a manpower and facility standpoint.

I am absolutely almost certain the FAA could not do it. It was spoken earlier about taking five years to hire and train people to do this job, and I think that's an underestimate.

We've hired a number of people in the last two or three years, we've grown rapidly, but our average mechanic seniority with Delta is now over 20 years. It's coming down, because we're hiring more people. I'm sorry, that's an inspector. Our mechanic is over 18 years. It takes a good long time to gain the experience to be an inspector and be a capable inspector and know what you need to

look for and what you are looking for and then finding it and then doing the right thing about it.

Mr. DUNCAN. So what you're saying in plain language is that if we did enact this that it would lead to increased costs to Delta and increased prices to the traveling public?

Mr. MAY. Absolutely. Yes, sir. Now, I don't think it's absolutely necessary to do that. There may be some things that could be done over and above what AATF has done in order to ensure that we do have the best possible, safest airplane that ever could be.

But I think we'll discover those as we continue the process we're in now between ourselves and FAA and the manufacturers. Laying this on top of what we're doing now I think would choke us.

Our average airplane is about eight and a half years, so we don't have to contend with much of this at the 20 years or whatever it is, so it wouldn't impact us near as much as it would others.

Mr. DUNCAN. All right.

Mr. DOLL. Me, for example.

Mr. DUNCAN. Yes, sir.

Mr. DOLL. I think we have about 100 airplanes right now, which is about a quarter of our fleet, that would be impacted directly by this in the first year after legislation was passed.

Mr. DUNCAN. According to the paper that I was given, Pan Am and Northwest really have the oldest fleets of the U.S. airlines. Is that right?

Mr. DOLL. That's probably true.

Bill, I don't know if you remember the stats or not. I think TWA is in there, too.

Mr. HOOVER. It would have a similar effect on them.

Mr. DUNCAN. All right, gentlemen. Thank you very much.

Thank you, Mr. Chairman.

Mr. OBERSTAR. I just want to respond to the point the gentleman raised about hearings sensationalizing an issue. I want to make clear what sensationalized the issue was Aloha Airlines coming apart in flight.

The hearings that we have undertaken in the past, both in the Investigations and Oversight Subcommittee in last year's hearings and this subcommittee, have been to reassure the public that all steps are being undertaken in the interest of safety, both by the manufacturers and the air carriers, as well as on the part of the FAA.

There's no attempt to sensationalize, rather just the opposite, to bring some order and discipline and focus on the needs.

Mr. DUNCAN. Well, if the Chairman would yield, let me say this very quickly. I did not intend that to be aimed at the Chairman or as any criticism of anyone on this committee, because I feel that the Chairman of this subcommittee is one of the more sincere and well-meaning members that we have in this Congress, but I just don't want anything that we do to scare anyone in the traveling public. That was my only point.

Mr. OBERSTAR. Well, we certainly want to move in that direction. That's the whole thrust of these hearings.

Mr. LANG. Would the Chairman yield? Because I had sort of a negative reaction to the statement by the gentleman from Tennessee when he made it, and my observation is we would be terribly

remiss had we not had these hearings, and as I've listened to the witnesses in the past year, I have felt greatly reassured by the job that these manufacturers and companies represent here today have done, and I think the hearings have produced some very positive reactions, because prior to these hearings there was a feeling, at least among the travelers I visited with, that there were more Aloha Airlines out there operating with different names.

So I think that these hearings have been very positive in the sense that they haven't been sensationalized but have been reassuring, and I appreciate all those that have participated in the hearings for the positive news that you've given us.

Thank you, Mr.Chairman.

Mr. OBERSTAR. The gentleman from Texas, Mr. Geren.

Mr. GEREN. Mr. Chairman, I have no questions. I just want to thank the panel for their participation.

Mr. OBERSTAR. We have gone a fairly long time. I do have some items with respect specifically to the legislation at hand, but I think this may be a good opportunity to take a lunch break and come back for about another 20 minutes and pursue some of the points that you have raised in your testimony and then take our final panel and conclude for the day.

We'll take a break and resume just around 2:00.

[Recess.]

AFTERNOON SESSION—2:28 P.M.

Mr. OBERSTAR. The subcommittee will resume its sitting.

Mr. Clinger, did you have some questions that you wanted to pursue at this time?

Mr. CLINGER. Just very briefly, and I apologize to all you gentlemen for running in and out during the hearing today, because this is an issue which I have an equal interest in with our Chairman, and perhaps if any of these questions have been asked of you, then just tell me that they'll be in the record.

We've talked about the major commercial producers. Are any of you gentlemen aware of any problems in the commuter airline business? Do you think there should be similar concern given to the small regional commuter-type aircraft in terms of the same sort of an exercise that you've gone through with Boeing, McDonnell Douglas and so forth?

Mr. WARREN. I would make a comment, and that is I think that the discipline and the rigor and the concept ought to be applied to some level to that batch of airplanes which are part of the civil transportation system.

Mr. CLINGER. That is not presently happening, however, is it?

Mr. WARREN. I believe it is, but I'm not sure of the extent.

Mr. COSGROVE. Yes, it's beginning to happen. We see it in some of the committees that we see some presence of the Beeches and so forth. They're very interested in what's going on. There's something happening.

Mr. CLINGER. Our legislation requires the FAA to inspect the air carrier aircraft in the last year of their economic design life, and traditionally this has been an area of airline responsibility, and we've heard it's been argued that the shift of the new inspection

responsibility from the airlines to the Federal Government would, in turn, shift the court liability arising from aircraft accidents to the Federal Government, that we would be involved.

What is your view of this argument that there would be a shift in liability to the Federal Government when the administrator inspects the aircraft and determines whether or not that aircraft is sufficiently safe to continue to fly?

Mr. DOLL. I think that was our impression, too, when we first read the bill. There was some discussion about that this morning with Chairman Oberstar and Mr. Broderick. I think we'd have to leave that to the lawyers, but that was, I think, most of our first impression, and the philosophical shift of responsibility or some perceived responsibility from the operator to the FAA was of concern to us, too.

Mr. CLINGER. On that score, I think it's more a perceived shift, not a shift of perceived responsibility, and we patterned this language after the existing language in the section I referred to and read from the basic FAA Act, and we will refine that language to make sure that there can't be any room for creative lawyering on the subject. I did not intend to have a major departure.

I want to get back to a point that has been raised again and again about this design life issue, and we've received some correspondence about that, industry representatives, none of whom are at this table, have said, well, you're adding a new idea using the term "economic design life," or you're adding a new concept in using the term "design life." In fact, I'm quoting from memory from a letter that we received.

My understanding and in all my years of experience, that's not a new term, and the committee didn't invent it. This is a standard concept used that may have different meaning and may have different application.

But when you manufacture an aircraft, it's done with a concept of some useful period of life on an economic basis, a point at which, I think earlier testimony from the panel indicated, the cost of maintenance exceeds some perceived value of continuing to operate that aircraft.

I'd like to explore that just a moment and get it clear who understands what in the term "economic design life" or "design life." I mean, we're using what I perceive to be a fairly common term within the industry, and if there are different meanings or different understandings, now is the time to clarify them.

Mr. Warren.

Mr. WARREN. I'd like to comment on that, sir.

Mr. CLINGER. Sure.

Mr. WARREN. I think the significance of the precision of the definition is important only if there is some precipitous action associated with it. If you look at the concept of doing a specific inspection of every airplane at its design life in a one-year time span, this becomes quite critical because that's a very short time span compared to the resources that are available.

If you look at it from the standpoint of the concept that we have in our alternative proposal, a precise definition is not required. What we did was to look at typically a 25-year design life, and that's a conceptual design life, and we took three-fourths of that.

That leaves enough elbow room that a lot of precision is not required. Further, the action itself that we recommend is an action that is for a duly qualified group to do a review and make some recommendations, so there is no hard time there.

At that time, the way I visualize it, a properly qualified group might make recommendations that this particular airplane type needs this particular inspection at so many landings or at so many hours or at so many months, but they'd be looking at it from the standpoint of 15 years of experience under their belt with a lot of fleet information that's been fed back to them.

So those definitions could be fairly loose. As I tried to explain this morning, the original concept years ago was a design goal or a design life, and we tried to redefine it in a way 12 or 15 years ago such that this did not become a hard, firm airplane throw away date, and that's why it has developed a label of economic design life. It's really not a very precise number.

Mr. CLINGER. Thank you.

Mr. Cosgrove.

Mr. COSGROVE. Where I get confused is more with I think people interpreting the word "life" as "death"—at the end of 20 years the airplane must be dead, and that is not what we intended. We really had a design objective that up to 20 years you would have normal maintenance, and after that you might have more cracking than you had during the first 20 years, and your economic burden would go up in terms of maintenance and inspection.

But there is no such thing after 20 years or 19 years or 18 years that the airplane really just falls apart at all. It's just that you're going to spend more money maintaining the aircraft, so when people say life, I think we get the wrong feeling. It's just that more cracking is going to occur than did in the 19th year.

Mr. CLINGER. Mr. Doll.

Mr. DOLL. That's essentially the point that I wanted to make. The other——

Mr. CLINGER. I think the two explanations dovetail very well, and that's the understanding I have.

Mr. DOLL [continuing]. Just one additional dimension that perhaps I could add. From the day the aircraft goes into service in somebody's fleet, and in our fleet specifically, there are constant changes to it through the service bulletin process that are improvements in systems, in parts of the airplane. As you get service experience, you just incorporate these things.

So the aircraft itself is changing. It's not like a fixed thing that you design it at this point and 20 years later it's the same. It's almost like a living organism. In fact, it's a lot like the human body, I guess. It has all the nervous systems and consumes fuel and everything else, and it depends on how well you take care of it in the early years as to how well it goes on in the later years.

That's why I say it's just an issue that first came up I think at the first Aging Aircraft Conference two years ago, and we've been trying to explain that ever since, and it's a difficult thing to explain, but I think life is a better description than death

Mr. CLINGER. Mr. May.

Mr. MAY. One further comment, that the things that obsolete an airplane from a given fleet, like Delta's fleet, is not a chronological

age. It's something to do with economics, it's getting too expensive to operate, it's something to do with operational problems, or it's something to do with operational capability within the environment you want to operate it.

Maybe it costs too much to modify it in that operational environment. It's not a chronological age, it's an obsolescence due to various reasons, and not a chronological age.

Mr. CLINGER. It may even be the routes on which that aircraft is operating. You need more capacity.

Mr. MAY. It may be airplanes that operate over water, and now we have an airplane that operates over water but maybe it's not far enough over water, so we need a longer range airplane. That airplane is obsolete, not because it's 20 years old, but because it can't do the mission we desire it to do.

Mr. CLINGER. Also, because the cumulative cost of maintaining may be greater than the company wants to pay.

Mr. MAY. As it gets older, it needs more attention in certain areas, but it's not necessarily always manpower, it's more surprises. If you could count on what it was going to do when it was 25 years old versus when it was two years old, then you could manage that, but you find things that maybe you didn't plan on, therefore your down time is greater, therefore it's not managed as well as a new airplane.

Mr. CLINGER. I saw a story just recently about a group of over-50 runners in California, and they were out in their annual competition or whatever they do, and they had T-shirts. One of them, the person was 91 years old, this was just a couple of weeks ago, and the T-shirt read "young at heart, other parts a little older."

Exactly the point. It's not the age. There are two terms I think are troubling: "aging aircraft," for want of a better term, and "economic design life." I have been very careful to focus on the number of cycles. That's the critical point, not how many years.

You take a 747 or a DC–10, they're designed to operate on the basis of maybe two cycles a day. A 737 or a DC–9 or MD–80 may be on the basis of six trips a day.

The larger aircraft will carry more passengers over its lifetime, the smaller aircraft will carry fewer but make more trips. It will have more take offs and landings, more pressurization and depressurization, more opportunity for exposure to corrosion.

What we're trying to get at in this legislation and in the work that your airworthiness task forces are focusing on is the increasing amount of maintenance that must be devoted to that aircraft as it gets to the higher end of cycles in the life of that aircraft, and what I see missing in that whole puzzle is at some point a stop, take stock, holistic view of the aircraft and, along with it, a need for more attention to the human factors in maintenance, both on the part of the FAA and the operators.

Perhaps as the number of cycles increases in the operation of that aircraft, the interval between "D" checks should be shortened.

Mr. May.

Mr. MAY. Yes, sir. We do that. Not necessarily in what we might call a "D" check or a heavy maintenance visit or whatever, but in elements within that aircraft that have to be inspected. We have a heavy visit on airplanes every 15,000 hours. We may do certain

things at 15,000, and we may do certain things at 45,000, every third one.

If we find we have problems in a given area, we'll reduce the frequency, if that's going to correct the problem, and that's looked at constantly as a part of our routine maintenance review.

Mr. CLINGER. To the carriers and the manufacturers, at what point in the life cycle span of the aircraft as it reaches the upper end of the higher number of cycles, applying this philosophy which has emerged from the task forces of terminate and replace, is there some cutoff point?

Mr. COSGROVE. Well, some things you cut off at 40,000 cycles, some things you cut off at 80,000 when you come to a 737, because the 737 20-year cycle life objective is about 75,000, but each one will be different, but none will go over what we call the 20-year point. Okay?

Now, there are some aircraft that are already into that, and we've got about two or three years to get these airplanes straightened out, but fundamentally when you hit that cycle time, that's when all these things become effective, or earlier.

In many, many cases it's earlier, because we know that we have problems earlier. It isn't a matter of waiting until you get to 60,000 or 70,000. You do it when the prevalence comes about that you've got to get it done.

Mr. CLINGER. It varies from aircraft-to aircraft, right?

Mr. COSGROVE. Part to part, absolutely.

Mr. CLINGER. Mr. Warren?

Mr. WARREN. I'd like to point out again what the Supplemental Inspection Program does. That took a look at the complete air frame, and this is for every model, and every model came up with different answers, we looked at all of the data available to us from the original design information, the original test information and all the service information, and from that we selected what we call key points ranging from 40 to 80 per airplane.

Now, these are critical points from the standpoint of the most likely places for cracking to occur, then we did a significant amount of analysis to better establish what kind of cracking, where it would be, so that the inspection could be very focused on a particular location.

This is done on a sampling basis, starting at, as I remember, 80 percent of the design life of the airplane. Depending upon how that sample works as the sample inspections are done, more airplanes are brought into that special inspection program.

This is something we put in place quite a few years ago, and it has been mentioned, we have done something like that again with the service action activity as part of AATF, and that was to recognize that some of the service bulletins and other service actions that were put in place some years ago should have a limited life, and we generally picked one lifetime for that limit.

Now, it varies from case to case and from fleet to fleet, but generally speaking one lifetime was the limit for those, so we have, to some degree, done what you said. We've looked at the whole airplane and gone through and done a very, very thorough evaluation.

Just for an order of magnitude, as I recall, the cost to us, this is our own kind of money without overhead, about $5 million of our

money to do the programs to do all the analysis to prepare the books for the DC–8, DC–9 and DC–10 aircraft.

There's a different program for the different models, there's a different program for the DC–8s with the re-engine and the original engine, the three different DC–10s have distinctly different inspections.

We started off by looking at the complete air frame, focused on the points that were the leading indicators and most critical sites, and then we specified directed inspections which are done starting at a fraction, almost 100 percent, an 80 percent fraction as I recall, of a design life.

Mr. CLINGER. That's very helpful. I appreciate it.

Mr. Doll, did you have something further to add?

Mr. DOLL. No. I don't think that in the supplement that we supplied with the testimony I had a breakdown on the service bulletins and their effectivity. It might be helpful if we made a matrix like that for you so you could see on a 727, for example, what the effectivity was for some of the different actions, but it does vary.

Some are based on cycles, some are based on years. So that was very much a part of the analysis, and I think it might be helpful if we supply that for you.

Mr. OBERSTAR. Very good. We'd appreciate that, and we'll receive it for the committee hearing record.

[The information to be supplied follows:]

Example Document Page

AGING AIRPLANE CORROSION PREVENTION AND CONTROL PROGRAM - MODEL 727

AIRPLANE AREA: FUSELAGE - LOWER LOBE - INTERIOR, EXCEPT BILGE

CORROSION TASK NO.	DESCRIPTION OF AREA TO BE INSPECTED	ZONES	EFFECTIVITY	I YEARS	R YEARS	REFERENCE S.B.'S.	NOTES
53-111-01	FUSELAGE LOWER LOBE INTERIOR STRUCTURE FORWARD OF THE BILGE, BS 178 TO BS 480 BELOW S-17, AND THE AREA ABOVE THE BILGE, BS 480 TO BS 740 AND BS 950 TO BS 1143 FROM S-17 TO S-36. ALL PRIMARY STRUCTURE INCLUDING SKIN PANELS, SKIN SPLICES AND JOINTS, FRAMES, STRINGERS, SHEAR TIES, SKIN CUTOUTS, BS 178, 740, FRONT SPAR, 950 AND 1143 BULKHEADS, W.L.G.U.U. STRUCTURE, MAIN DECK FLOOR STRUCTURE AND DOOR INTERIORS WITH PARTICULAR ATTENTION TO THE FOLLOWING:	1-11, 1-12, 1-13, 1-14, 1-15, 1-16, 1-31, 1-74	ALL	6	6		1
-01.01	LONGITUDINAL SKIN LAP SPLICES.						
-01.02	CIRCUMFERENTIAL SKIN BUTT JOINTS.						
-01.03	AREA UNDER GALLEYS AND LAVS., INCLUDING MAIN DECK FLOOR STRUCTURE.						
-01.04	SKIN AND DOUBLER AT S-27, 20 AND BL 0 BONDED STRAP FORWARD OF BS 480.						
-01.05	TOP PANEL OF THE NOSE GEAR WHEEL WELL, INCLUDING CHORDS, WEB AND STIFFENERS.						
-01.06	CARGO DOOR [illegible] STRUCTURE.						
-01.07	SKIN AND DOUBLERS AT ANTENNA CUTOUTS.						
-01.08	SKIN AT FORWARD AND AFT TOILET SERVICE PANELS.						
-01.09	BS 360 AND 1183 PRODUCTION JOINT SPLICES AND BOLTS.						
53-111-02	CARGO DOOR INTERIOR STRUCTURE.	1-13, 1-15	ALL	6	6	52-122	2,4
53-111-03	FUSELAGE SKIN, HORIZONTAL WALKWAY BEAM AND CHORDS AT INTERSECTION WITH THE NOSE LANDING GEAR WHEEL WELL.	1-31	ALL	6	1.5 OR 3		3,4
53-111-04	WING CENTER SECTION FRONT SPAR LOWER WEB.	1-74	L/N 001 - 1415	SEE	NOTE	57-146	5

NOTES:

1) A DUAL COAT OF CORROSION INHIBITOR PER BASIC TASK PART 60) IS RECOMMENDED IN AREAS UNDER GALLEYS AND LAVS., INCLUDING SKIN AT TOILET SERVICE PANELS (OPTIONAL).

2) INCORPORATE S.B. 52-122 DRAIN MOD. AT THE IMPLEMENTATION AGE FOR DEACTIVATED NO. 3 CARGO DOORS.

3) RECOMMEND MODIFICATION PER S.B. 53-157 FOR AIRPLANES L/N 1 - 1544 (OPTIONAL). REPEAT INTERVAL OF 1.5 YEARS FOR AIRPLANES L/N 1 - 1544 WITHOUT MOD. PER S.B. 53-157. REPEAT INTERVAL OF 3 YEARS AFTER MOD. AND FOR AIRPLANES L/N 1545 AND ON.

4) A DUAL COAT OF CORROSION INHIBITOR PER BASIC TASK PART 60) IS RECOMMENDED FOR THIS AREA (OPTIONAL).

5) VISUALLY INSPECT AND ACCOMPLISH TERMINATING ACTION PER S.B 57-146 WITHIN 2 YEARS OF THE EFFECTIVE DATE OF THE A.D. FOR THIS DOCUMENT.

Mr. OBERSTAR. The issue of cost has come up, and to your credit, you have not hung that cost factor out front and said, "Don't make us do it because it's going to cost so much."

I think the industry and the carriers alike, the manufacturers, the carriers, all approach this issue of aging aircraft on the basis of let's do what needs to be done to make sure that we're providing the highest possible maintenance and did not squirm about costs, but cost is a factor.

It is a factor in determining how long you're going to continue to operate a high cycle aircraft. On a 737, let's say, not the Aloha Airlines 89,000 or 91,000 cycles, but something more in the mid-range, and you get to a "D" check on a 737 that's, say, 50,000 cycles, what does that cost?

Mr. MAY. I can tell you more on a 727 or an L-1011. We don't have any 737s that old.

Mr. OBERSTAR. Sure.

Mr. MAY. On an L-1011, a "D" check now, a heavy visit which is on a calendar 48-month rotation, costs us about roughly 30,000 manhours, which includes maintenance and modifications.

On a 727 at 15,000, which is half a visit, so I'll have to double that, we're running probably 12 to 15, so about the same thing. Roughly 25,000 or 30,000 for a full block, a 30,000-hour block. That's manhours, not materials.

Mr. OBERSTAR. Manhours, okay.

Mr. MAY. I don't what material costs.

Mr. OBERSTAR. How do you translate that into a one-time cost of that?

Mr. MAY. Well, we use internally now, our direct labor without overhead and without fringes and that type of thing, around $28 an hour, as I recall.

Mr. DOLL. I would say that our costs are essentially the same. We do everything pretty much the same, really, with the equipment that we have to dock the airplanes and so forth. The 737s and 727s are both up to about 35,000 manhours now.

We've implemented some of the additional corrosion program things and the terminating action skin laps and so forth. About 35,000 hours and about 28 days out of service for those. We call it a heavy maintenance visit, and we have six different levels that we do.

I think just in round numbers you're talking somewhere around $1.5 million to $2 million an airplane.

Mr. OBERSTAR. Is that on a 737?

Mr. DOLL. Yes, and a 727. They're roughly the same. The 27 would be a little bit more.

Mr. OBERSTAR. What do you suppose that aircraft returns on revenue to the carrier over its 20-year life span?

Mr. DOLL. Leverage is pretty significant. Most people don't realize how few airplanes generate how much revenue for an airline. We're somewhere between $9 billion and $10 billion, and we have 450 airplanes, so proportion it out wide body to narrow body, and it's still a pretty significant amount of dollars for every day it's out of service.

Mr. OBERSTAR. I did some rough calculations taking a 737-300, and we put our heads together and tried to make some estimates,

and figured it might over 20 years carry in the neighborhood of 3,100,000 passengers, and we figured a revenue per passenger, and it came up to around $300 million, and using the industry average of about 11 percent or 12 percent of company revenue invested in maintenance, it comes up to around $36 million on that $300 million over the life span of the aircraft.

Mr. DOLL. I think maintenance costs might be a little bit higher than that. It's probably more toward 20 than it is toward 10, as a percentage. Not of revenue, I guess, though, no.

Mr. OBERSTAR. If you take the industry figures that we follow periodically, at what point do you determine that it's too expensive to maintain that aircraft and decide to cannibalize it or sell it off to somebody who doesn't have the same kind of overhead problems?

Mr. MAY. I really can't answer the question, but there are factors——

Mr. OBERSTAR. It's not on your end, in other words. That's a corporate level decision?

Mr. MAY. Yes, it is, but there are a lot of factors. You don't just decide it's too expensive to operate. You have to look at what are you comparing it against. If I don't operate this airplane, what airplane will I operate and how efficient is it going to be? If I have now a 727 and it's really too small for the routes I want to operate it on, and I really need a 757, then it's an economic decision and not a decision that the 727 is 15 years old, it's costing more than it did five years ago. That's a very small part of the equation, how much more is it costing to maintain the airplane.

The much bigger portion of the equation is what size do I need, what mission do I need, how much more efficiency and how much lower seat mile cost or plane mile cost can I get out of the new product that I want to replace it with?

Mr. OBERSTAR. Exactly. If over its lifetime a 747–400 can yield in the range of $1.2 billion revenue, and your maintenance costs run in the range for "D" checks of $3 million to $4 million, you can do an awful lot of maintenance before you run up against the cost of a new aircraft.

Mr. DOLL. Well, I think that you'll find the industry has a wide range of cost accounting systems that feed numbers into that calculation. For example, Delta's fleet is very new compared to ours, and American is somewhere in the middle.

Everybody is operating with the same information but coming to different conclusions. It's a rhetorical question how do you account for disruption, non-routine events. The airplane is supposed to go out of the hangar today and you find a crack and now it's out of the schedule, and those things happen more frequently as the airplane gets older, and I'm not sure all of us account sufficiently for the number of people that we have employed to handle those disruptions.

Disruption of schedule, rescheduling airplanes, rerouting and so forth, so that really it comes down to cost accounting as to what that airplane really costs you, and the maintenance cost may just be a small fraction of what that airplane costs you in terms of your overall operation.

Mr. OBERSTAR. In any event, the issue of high time aircraft is here for at least a decade and maybe longer, depending on how fast

the two manufacturers at the table can produce new aircraft and whether Airbus makes any inroads in the U.S. market and takes market share away from us, which we certainly don't want to see, we want them to have to adhere to the highest and toughest standards as well, and meanwhile those aircraft that are flying are going to continue to fly.

Mr. DOLL. And get older.

Mr. OBERSTAR. And get older.

Mr. DOLL. As soon as either Dale or Ben deliver an airplane to me, it starts to become a maturing airplane problem.

Mr. OBERSTAR. Well, we will continue to refine this legislation and develop a regime that will keep all of us on course, the Government, the manufacturers, and the carriers on a common mission of assuring the highest possible degree of safety, and I compliment all of you on the work that you've done and the contributions you've made in that effort. Thank you.

Mr. DOLL. Thank you, Mr. Chairman.

[Mr Doll's prepared statement appears on page 93.]

Mr. OBERSTAR. Our next witness is Captain William Melvin, Chairman of the Airworthiness and Performance Committee for the Air Line Pilots Association.

Would you please identify your associates?

TESTIMONY OF WILLIAM MELVIN, CHAIRMAN, AIRWORTHINESS AND PERFORMANCE COMMITTEE, AIR LINE PILOTS ASSOCIATION, ACCOMPANIED BY JOHN O'BRIEN, DIRECTOR OF ENGINEERING, AIR LINE PILOTS ASSOCIATION, AND BOB HALL, SENIOR STAFF ENGINEER, AIR LINE PILOTS ASSOCIATION

Mr. MELVIN. Good afternoon. I'm William Melvin, Chairman of the Airworthiness and Performance Committee for the Air Line Pilots Association. On my left is John O'Brien, who is Director of Engineering and Air Safety for the Air Line Pilots Association, and on my right is Bob Hall, a Senior Staff Engineer with the Air Line Pilots Association.

I can make my remarks brief. We have the statement that we have sent in. Basically, we support the intent of the legislation. I want to talk about the design life.

When the engineer designs the airplane, he has a goal. He is given parameters to design by, and the engineers select the material, they select the strength of the material, they do the calculations, all based on these parameters which are the design life of the airplane.

The FAA and the manufacturers know what those parameters are for every aircraft that's in service. Now, it's true that the airplane may be flown past the design life, but the tests that are done to prove the design life, which are the fatigue tests, are based upon those parameters.

The question is, what do you do when you try to fly an airplane beyond its design life? Do you need to do something? Do you need to stop and check, and do you have to prove to someone that this airplane is capable of flying beyond its design life? We think that that should be a fact, and we think that you should tell the FAA that they have to do that.

Now, we have some suggestions to change the bill, and that is that we feel and agree with Tony Broderick that the FAA is not suitable to do this type of test, that it should be done by the operators who are certified to handle "D" class checks. We also believe that it could be incorporated into "D" checks. We believe there's some merit in requiring that "D" checks be done more frequently if an airplane is, in fact, flying beyond its design life.

The major critical element that we think is inherent in flying beyond the design life is the risk to pressurized aircraft that are flying beyond that point which has been proven to be safe by the fatigue test of pressurization, when you get beyond that point, you're taking a high risk that you'll have multi-site fractures and failures that are not detected, and the airplane will blow up.

That's why our policy is one that would allow an extension of the design life with adequate testing and engineering analysis, but would set a new limit on the extension, and then each subsequent extension would be cut by a factor, which we've suggested to be cut in half, unless at some point someone, either an operator or a manufacturer, decides to take the airplane and do more fatigue testing, full scale fatigue testing, of the pressure hull.

It's obvious that if you take one lifetime plus half a lifetime plus a quarter of a lifetime plus an eighth of a lifetime, you have a series there that would never reach two. You'd never fly the airplane beyond the original test unless you did more testing, and we think that this is one of the more serious implications of flying the aircraft beyond its design life.

Now, certainly, an airplane that is in service that is not properly maintained and does not have a corrosion program is at more risk than an airplane that is properly maintained and has proper corrosion control.

We think that the FAA should have a mandatory corrosion program for all airlines and all operators. The SDRs, which are the service difficulty reports, they were brought into question by the National Academy of Science study in 1980, which is called the Low report.

Recommendations were made then that the FAA use the SDRs to do more analysis. The FAA themselves recognized this problem in 1984, when they took suggestions from the industry. As yet, they have not done this.

We have made suggestions in our submission to changes to the legislation which we think would comply with the intent of the legislation and would also provide the relief of allowing those operators who are qualified to do "D" class checks to incorporate that into some type of test and check in order to carry an aircraft beyond its design life. Thank you.

Mr. OBERSTAR. Thank you very much, Captain. We appreciate your testimony, and I think that of the Air Line Pilots Association is particularly important to this hearing and to this legislation, because you are the people who are in charge of that aircraft and who are the ultimate determinant of whether that aircraft flies or stays on the ground.

It's your judgment that has to carry whenever there's any question, so you're the ones who are more directly on the firing line

than anyone else, and we particularly appreciate your input and your understanding of the issues at stake here.

You have focused on a point of some, how shall I say, discussion or disagreement among many participants in this hearing, and that is life. That's called life of the aircraft, and you have done a very good job on pages 4 and 5, design life, economic design life, citing the several terms that could be applied, and you go on to say that we should be talking about a service life established by mandatory full scale pressurization fatigue testing to at least twice the service life value.

I think it would be useful if we could have a comprehensive, all inclusive definition of the word or term "life," economic design or service life or whatever it is, and we'll attempt to do that.

But there is such a thing as standard industry practice, and what we were trying to do in taking that term was to use standard industry practice. As soon as we did, the industry looked at it and said, oh, goodness, don't use our own words on ourselves, we're not quite sure what we mean by that now.

You suggest full scale pressurization fatigue testing. To what extent is that technique now used in the industry?

Mr. MELVIN. It's used by most major manufacturers. I believe it's probably being used on most of the aircraft that are in service today. It's a standard that's recognized throughout industry and in the universities and the text books that talk about fatigue testing, and generally the two times factor is one that's very well known.

The manufacturer, when they give the engineer the problem of designing the airplane for, say, 60,000 hours and 30,000 flight cycles, whatever their goal is, they will then test the airplane to be sure that they hit their goal, and they'll normally throw in this two times K factor, and they'll test the airplane for twice that in the original certification.

They build a really good airplane, and the airplane comes to the end of this life, what we would call the design life, what justification do you do to fly the airplane beyond that point? We fully agree that it can be flown beyond that point, but we feel that some requirement should exist to prove that the airplane should be flown beyond that point.

Where we see a disagreement in the industry is that others who may share our view don't want someone to draw the line. They would like to have the line somewhat flexible and maybe discover it hopefully not by accident but discover it through an inspection or some other means, but continue without having a point that you have to arrive to and justify crossing that point. We see that as a major distinction between what we propose and what others would propose, and, of course, the distinction in your proposed legislation.

Mr. OBERSTAR. That very simply put is the thrust of the purpose of our legislation and the motivation for it. As witnesses last Fall said, aircraft can fly forever properly maintained and with all the qualifiers.

Supposing they're wrong? We need to have in place some verification process that all of the steps everybody knows need to be taken are, in fact, taken and that at some point you stop, take stock, make an assessment, make a determination, and that's what you've just said.

There should be some verification that the aircraft is safe to fly beyond that point. That's all this legislation is seeking.

Mr. MELVIN. The manufacturers are concerned about this. As you know, Douglas took an old DC-9 and ran it up to many, many test cycles, and Boeing did the same with a 737. They don't want their airplanes to fall apart, but what we see is that they don't want the line drawn.

In other words, they will test at times, but I see that they don't want this requirement, and we feel that the requirement should exist.

Mr. OBERSTAR. Well, I appreciate that very much. When you say the line drawn, I read the manufacturers and the carrier representatives to be saying if there is a line, it has to vary from aircraft to aircraft and type to type, depending on its use. Right?

Mr. MELVIN. Well, it would. You might find an aircraft that's had bad maintenance and has some corrosion would never reach the design life, but the question is, when you cross a design life that hasn't been validated in the original certification, then what do we do now?

It's appropriate to test the airplane. You can take an old air frame and cut it up and see where the risks were, and you can, through sound engineering practice, determine that the airplane can proceed.

The military does this all the time. They buy a fighter that perhaps is designed for 400 hours, and when they get through, they find out that it's in very good shape, and they justify carrying and extending the life. This is what we feel can be done, but the life is extended for a certain period of time, and then you do it again.

Mr. OBERSTAR. That very simply is the thrust of this legislation and the purpose of the legislation, to say that you design an aircraft to operate within certain parameters, when it reaches the outer limits of those parameters, stop, take stock, make an assessment, look over its entire maintenance history, at some point in its life span get an overview of how that aircraft has been sustained and maintained, and say, all right, all of the appropriate actions have been taken or some have yet to be taken, other steps yet to be taken, do those things, and then move on for some other future period of time.

Mr. O'BRIEN. Mr. Chairman, I think the difference in opinion or disagreement comes up in the varied interpretations of what happens when you reach that design life or service life, and for those who are afraid to draw the line, they are concerned that for some reason you may have to throw an air frame away, and we certainly are not suggesting that.

The only time that you'd ever even consider doing that is for the economic reasons that the previous panel talked about, based on their own internal assessments of when they would get rid of an airplane, or if we found, through this proposed establishment of airframe life and the inspection that's required, that an airframe is not worthy of carrying on because it had not been maintained properly. Other than that, obviously you would continue to use the airframe.

If we could define what was going to happen when you drew this line, we could reduce the concern that some people have. What

should happen would be obviously an inspection, and if the inspection turned out to be proper, and all the maintenance records were up to date, then there would be no problem in continuing using this airplane.

If everyone understood that, then there might not be quite as much reluctance to go ahead and adopt this concept. Also, if we could be assured that everybody, every operator, was as diligent in maintaining their airplanes as the two previous operators we heard from, then we may not be quite as concerned over the necessity to have a line drawn at some point. We're not sure, as indicated when we talked earlier in the hearing about leasing and changing equipment from carrier to carrier, that maintenance records are going to survive all those changes, that we are going to be able to verify that all maintenance was performed properly, that all ADs were complied with, and that all suggested service bulletins were performed. Unless we can do that, then we're not confident in the airplane and that we should continue to operate it.

Mr. OBERSTAR. That's the point, and there have been some suggestions outside the context of this hearing that, oh, if you draw that line at whatever that point in the life span of an aircraft may be, carriers will withhold maintenance until they get to that point and then do the big check.

Or they'll legally do all that's necessary, won't walk the extra mile, and then at that point sell that aircraft to a third world operator or some non-U.S. operator.

I don't think any of those things is likely to be characteristic of industry response. You may have some of that, but I think you have that now. I think that situation now exists. Carriers make determinations on various bases, some of which we've heard already, that it's no longer economical for them to operate this aircraft, and they dispose of it, because it doesn't meet their needs on the particular routes that they're flying or it's developed some problems that they don't wish to continue spending money on. We've heard those discussions already.

We do think that there is some envelope and maybe some flexibility with it, and it may vary from aircraft to aircraft on a type and model basis, but that factor is there, and we can't ignore it. It's got to be addressed in the manner you're outlining.

Mr. Clinger.

Mr. CLINGER. Thank you, Mr. Chairman.

Thank you, gentlemen. One of the concerns raised by Mr. Broderick this morning was the question of resources within the FAA to meet what would be required of it under our legislation. How would you characterize the adequacy of the FAA workforce today, and do you have any ideas how adequate they would be to inspect carriers, repair stations, aircraft, all of the myriad of responsibilities they already have, and add to that the inspection requirement under this bill?

Mr. O'BRIEN. First of all, Mr. Clinger, we feel that the FAA is not best suited to do the type of inspection described in the proposed legislation. We feel that the carrier and the manufacturers combined have the expertise to do the actual hands on practical work.

Concerning the other part of your question, we don't feel that the FAA has an adequate number of inspectors today to do their current required inspection. As Mr. Broderick pointed out, they are in the midst of an effort to obtain more people, and I guess they have another year and a half to go in their program before they're completed.

But with the introduction of the foreign repair stations and other aspects, of new technologies, composite materials, fly by wire, fly by light airplanes, and the technology continues to evolve, we are concerned that not only do they not have an adequate number of people, but they don't have an adequate level of expertise to actually do the type of inspection that is necessary to make sure that everybody is complying with the intent of the regulations. So it's an ongoing process. The FAA will need additional resources in order to carry out its mandate.

Mr. CLINGER. Earlier today, Mr. Broderick asserted that their Aging Aircraft Program represents "the best thinking of Government and industry," and argued that the FAA working in cooperation with industry is taking all of the right steps to ensure safety, they're doing everything necessary to ensure safety. Would you concur with that assessment?

Mr. MELVIN. Well, we're very pleased with some of the results, and we're pleased with the airworthiness directives that have been issued, and the cooperation of the manufacturers in identifying faulty areas in their aircraft.

One area that we would disagree on is drawing the line for the mandatory requirement to justify service beyond that point.

Mr. O'BRIEN. They talk about concepts or fixes that they're still working on, yet to be developed ways of looking at aging airplanes. What troubles us a little bit about that is that we're not sure whether those are going to be applied in a mandatory way or whether they're going to be voluntary or whether just carriers with the capabilities of Delta or United or some of the other majors would voluntarily apply.

What we're concerned about is the other 50 operators that we represent pilots for and making sure that all of those 50 carriers not only have the capability but have maybe a sense of direction levied on them by the FAA so that they know what is expected, and there's no question as to what is expected in order to maintain an airplane properly.

Mr. CLINGER. You raised, Mr. O'Brien, earlier the concern about the fact that many of these aircraft go through many different operators during the course of a lifetime and are leased to different operators over maybe a 20- or 25-year period, and I gathered you have some lack of confidence that the maintenance and service records that are maintained on those aircraft are adequate to ensure that the aircraft continues to be up to standard and safe?

Mr. O'BRIEN. It's more than a lack of confidence. We are aware that in some cases the maintenance records just don't exist, so with incidents like that or examples like that, we are troubled by what might happen in the future, unless there is very specific guidelines developed by industry and somehow blessed by the FAA, either through a regulation advisory circular or something, some kind of

a document, formal guidance, that can be carried through by all operators.

Mr. CLINGER. In other words, there needs to be some kind of mandated standardization.

Mr. O'BRIEN. Yes. Earlier, both Mr. Broderick and I think the panel that followed him discussed the situation of some kind of an inspection process when an aircraft either came into the States or left the States, checking on maintenance records and past history. Some such program obviously should be required.

Mr. CLINGER. Captain Melvin, in your written statement you indicate that the service life of an aircraft should be established through mandatory full scale pressurization testing of the aircraft for fatigue.

If there were similar models in terms of skin structure and so forth, would you feel that one test could be done on one aircraft that might apply to several, if they were comparable? Because these are very expensive and obviously difficult to carry out.

Mr. MELVIN. Well, it depends on comparable. Probably not, and there's a very good example listed in the Low report, which is the National Academy of Science report of 1980, of a Dan-Air 707 Model 300 series where that logic was used, and they extended the horizontal stabilizer on the aircraft and used the fatigue analysis that was used on their earlier airplane because they were similar, and it turned out not to be correct, because they changed one of the skin panels, and that's what caused the horizontal stabilizer to come off. It was fatigue failure, and the airplane crashed.

There are subtle changes that occur in structures as you go from one airplane to another, and these subtle changes can lead to stress points that could cause fatigue failure, and each one should be tested.

Mr. CLINGER. Individually?

Mr. MELVIN. Not each airplane, but each type.

Mr. CLINGER. No, I understand. Each type.

Mr. MELVIN. Yes.

Mr. CLINGER. Thank you, gentlemen.

Thank you, Mr. Chairman.

Mr. OBERSTAR. To what extent is the Air Line Pilots Association comfortable with the progress of the corrosion control program emerging from the task force recommendations?

Mr. O'BRIEN. Well, it's kind of a mixed blessing. Well before this situation ever developed from the Aloha accident, there was an understood need within the industry for corrosion control programs. It was not a mandatory aspect of an approved maintenance program. In other words, you didn't have to have one for FAA to approve your particular maintenance program.

Many carriers that we're aware of had corrosion control programs described in their approved maintenance programs, excellent programs on paper, but never had had those applied in practice, because it was not mandatory.

So, yes, we're encouraged by the fact that the task force is addressing that problem; however, there are years of experience from some carriers who had such programs underway, and we think that it would be a very easy thing for the FAA to do by, just

through a stroke of the pen, saying that you must have a corrosion control program as part of your approved maintenance.

It's not something that a lot of research would have to be done in order to develop an adequate program, since a lot of experience has been gained by some operators with effective programs already.

Mr. OBERSTAR. FAA has that authority right now. They don't need new authority to insist that it be accomplished.

Mr. O'BRIEN. I guess maybe that's our frustration. Why should the FAA wait for an industry task force to tell it that all airlines should have a corrosion control program, when it's sort of a common sense approach to doing business?

Mr. OBERSTAR. You would like to see that move faster. Your testimony clearly shows frustration with the progress toward a mandatory corrosion control program.

Mr. O'BRIEN. Yes, we have addressed this particular issue in the past with the FAA long before we had the Aloha Airlines accident, and so I guess a level of our frustration shows in the testimony.

Mr. OBERSTAR. Would you recommend that some special attention be devoted in the legislation to the concept that ALPA has expressed of a mandatory corrosion control program?

Mr. O'BRIEN. Yes. I guess in our testimony, we had several suggested changes to the legislation, and one of the key elements of our testimony was corrosion control. We think, though, that if some legislation were developed which basically gave instruction to FAA that you must implement an approved maintenance program which would be based on a concept of the service life, or whatever we want to call it, and contained elements like corrosion control programs but not just limit it to that, leave it up to the industry to add additional elements if they so chose, I think that that kind of legislative approach more general in intent would be helpful to the industry and maybe get away from some of the fears of drawing hard lines like 20 years or telling FAA that they had to do the inspection, when everybody in industry realizes that they really don't have the expertise or the capability to do the inspection.

So I think the intent of the legislation is well-founded. It's just a matter of describing a program that is acceptable to industry, one that they can carry out with a little bit of latitude.

Mr. OBERSTAR. The point you mentioned, on page 6 of the testimony, of the service difficulty reporting system, pages 6 and 7, and the criticism that it hasn't moved along as fast as you feel, and rightly so, that it should have done, your suggestions are to make the SDRs mandatory and to standardize them in some fashion. Do you have some suggestions about how that could be standardized?

Mr. O'BRIEN. Yes, sir. First of all, we think that the program itself should be made mandatory. In other words, there should be a mandatory requirement to report maintenance difficulties or service difficulties to some central data collection point so we can do proper analysis.

But right now, even if it were mandatory, without some standard way of reporting this information, there would be no way to properly analyze it. I'll give you an example of what I mean without mentioning specific airlines or air frames.

We're involved in a lot of mergers today. Prior to a merger of two large operators, one operator was reporting problems through

the service difficulty reporting system with fuel systems. This involved design and maintenance and readability, interpretation of data by flight crews, several different aspects to it.

Another operator operating the same type of equipment, the same fuel system, didn't have any of these problems. At least, none were reported. These two operators merged, and suddenly there were no more reports from either operator, so you might assume that either the problem was fixed because of the merger and different maintenance techniques that were being used, or the technique of reporting by one carrier was now used by both carriers, and the same situation was occurring, it just wasn't reported.

Sadly, the latter was true, because we had a couple of airplanes that actually ran out of fuel and made emergency landings partially as a result of this situation.

So, again, that's just an example of situations that can be detected through a service difficulty reporting system, and incidents, and even accidents, that could have been prevented if we had collected and analyzed properly. But we only can do that through mandatory standardized reporting procedures. Standardization is using like terminology, using the same reporting format from individual carriers, so that when this information gets into the FAA at whatever central repository there is the people who are collecting this information can understand it and enter it into a computer data base in a fashion that's going to be suitable for analysis after the fact.

Mr. OBERSTAR. Do you recommend that the legislation include this language making SDRs mandatory and directing the FAA to standardize the reporting procedure?

Mr. O'BRIEN. I think, without specifically mentioning SDRs, I think if the legislation directed the FAA to implement a system that would collect data, analyze it properly, and also request the resources necessary to do the proper analysis, then the legislation would fulfill every intent that we need. The industry, without arguing over whether this is an SDR program or an MMR program or whatever it might be, can go ahead and get about the business of implementing something that is jointly arrived at throughout the industry.

Mr. OBERSTAR. That's a very good suggestion. Thank you. The industry panel suggested earlier that it should be mandatory for the carriers to have independent quality assurance organizations within the individual companies.

Do such entities exist now in your experience? If so, how well do they operate, and would you recommend proceeding along the lines of that suggestion?

Mr. O'BRIEN. Some carriers do a much better job than others in using such a concept or philosophy. We, as an association, have stated publicly and we have policy that suggests that every air carrier should have a safety department. We see this as one of the responsibilities of a safety department.

The FAA administrator, at a recent luncheon at the Aero Club, suggested that it may be possible to go about doing business in a little different way if carriers had a good internal or self-audit program developed. If the operators found problems, violations of regulations, and if they brought them to the attention of the FAA,

along with a good correction or solution to the problem, the FAA would forego any kind of certificate action or penalties.

This has some potential as long as there is a good internal audit capability, which is what I think you're suggesting. Without some defined criteria which would identify what is a good internal audit capability or a good internal structure, I don't think that the administrator's proposed way of doing business can be carried out efficiently or effectively.

So it's kind of a long answer to your question, but I think that the question you're getting at revolves around a central function within the organization of an operator that is dedicated to inspection, internal audit, quality control, safety maintenance, whatever you want to call it.

Not all operators have that. I know the FAA is looking at that concept, the Office of Aviation Safety under Mr. Potts is very active in this area, and we have been encouraging them to pursue it.

Mr. OBERSTAR. We will proceed further with that suggestion. A final point, there has been some question about what should be the role of the FAA, and earlier testimony found fault with what was perceived in the legislation as language changing the role of the FAA from principally an audit function to a more activist function, actually inspecting aircraft.

Do you share the industry view that the FAA should not have an activist inspection function but should simply be an auditing agency?

Mr. MELVIN. Well, we think that the FAA should not be actually doing the hands on type of inspection. We think that they do serve their role as an overseer to see that the inspections are done properly, they're done by properly trained people and that sort of thing.

We'd really like to see it more as a cooperative effort, where the FAA did proceed along the lines the administrator suggested, and that we're all in this together, and we'd like not to see any airplanes crash.

So much of it's reactionary, that is, they're going to go out and catch someone breaking a rule and fine them instead of working together to solve the problems.

Mr. OBERSTAR. I don't think we had in mind finding something wrong and imposing fines. What we have in mind in this legislation is, recalling the words of an FAA inspector some years ago in another hearing I conducted, "we're reviewing paperwork," I think his words were, "we're inspecting paperwork, not engine work," and a feeling that there ought to be more personnel and more training and actually get into the maintenance bases and do hands on review of the maintenance work that is being conducted.

Mr. MELVIN. Oh, we agree with that. The FAA is understaffed, and they do need to expand, they do need more training, they need more expertise. A lot of these are suggestions that are in the National Academy of Science report that I referenced, from 1980, the title of which is, "Improving Aviation Safety."

They recommend the very things you're talking about, to build up an esprit de corps among the inspectors and the way to do it. These things have been recognized before. I didn't mean to suggest

that your legislation was looking for ways to fine people. I was just talking about the way we cooperate within the industry.

Mr. OBERSTAR. I agree that a cooperative spirit is important. We've had testimony before, and I've had many discussions with individuals that, you know, there's a lot learned just sitting and talking with each other mutually in a non-adversarial approach.

We're not talking about a police-type inspection. What we're talking about here is the FAA personnel actually seeing the aircraft itself, getting in there and looking at how the work has been done and is it done properly. That's what we're talking about.

Mr. O'BRIEN. Mr. Chairman.

Mr. OBERSTAR. Yes?

Mr. O'BRIEN. I think there is probably a misconception within the industry over exactly what you intended by this legislation in that area. Some people looked at the FAA as actually going out and doing the physical work as the extreme case, and others looked at an FAA inspector looking over the shoulder of every mechanic continuously, and other people I think assumed more properly what you expected, that there would be occasional FAA visits to the actual hangar where the work was being done. There would be some looking over the shoulder and there would be some looking at what was found, irregularities, if there was a crack found, if there was corrosion found, the FAA would be involved to look at that as well, but the normal inspection duties would be done by the line mechanics, and there wouldn't be an FAA person standing there 100 percent of the time. It's just impractical.

I think that without defining actually what was meant, the worst case scenario was accepted and bandied about, and that led to a lot of——

Mr. OBERSTAR. I think we'll make you Associate Administrator of the FAA for Compliance and Maintenance, and we'll solve that problem, because you understand exactly what we're talking about.

One communication I received went so far as ridiculously, in my judgment, asserting that our legislation would require the carrier to surrender control and ownership and title of the aircraft to the FAA. Well, that's absolutely absurd. There's no such language in the bill and no such implication in the language that we wrote, and, in fact, it parallels existing law in at least one respect.

So I think that's really carrying things too far, and you've got the right concept. Perhaps we need to adjust the words a little bit to make sure that it's clear that's what we intend, and we're going to proceed along those lines.

We will have legislation, because to tell you the truth, the traveling public is concerned. I get on aircraft, and people turn around, I fly back and forth to Minnesota, I go to other parts of the country, and they don't recognize me, but they do recognize me when I go up to Minnesota, and they say is this aircraft okay? Did you check how old this aircraft is? Is it safe to fly? I say, hell, I'm sitting down here, and in five minutes I'm going to go to sleep. I'm confident of it.

They're concerned, and they trust. They trust the carrier, they trust the pilots, they know they aren't going to fly that aircraft if it's not in shape to fly, they trust the manufacturers to build aircraft the right way, they trust the FAA to make sure that the man-

ufacturers and the carriers are all doing their job the way they should be doing it.

They have an awful lot of trust in all of those who are part of that enormous support system to keep aircraft flying properly. What we want to do is walk that extra step to make it clear that a higher degree of attention is being placed upon those high cycle aircraft.

Mr. Hall.

Mr. HALL. I just wanted to say one thing. You talked about changing the language slightly of the bill, and you raised the issue already but maybe it didn't quite get resolved. I didn't want to beat a dead horse, but it has to do with the economic design life.

Of course, what we're all here for is to look at the safety issue. I think we muddied the water by using the term "economics". The economics of the situation will be decided by the airlines in their various board rooms. What we want to address is the safety of the issue.

So possibly by including the word "economic" in the phrase "economic design life," we got a little far afield. I might suggest that when you rewrite the rule you use some other term, either "design life" or what we refer to as "service life," and that life is based on sound and acceptable engineering practices. In fact, that's what the design engineers do.

They ask how long is this airplane going to be used or how many cycles is it going to be used for, and then they go about selecting the materials, building the strength of the airplane so that it will last that long. Then they do full scale fatigue testing, both pressurization and cyclic testing of the wings.

So that's the crux of the issue. Your bill should mandate the establishment of a service life, and then what you do after that service life, should be done using engineering practices. We think that's an important part of the legislation.

Mr. OBERSTAR. That's a very good suggestion. As I said earlier, I didn't invent the term. It's a term the industry invented and has consistently used, and we applied it in this language, and we thought it was a fairly common understood term until they started using it on themselves, and then they thought maybe it wasn't such a good idea. So we'll find a way to be more precise about what it is we have in mind and proceed from there.

[Mr Melvin's prepared statement appears on page 123.]

Mr. OBERSTAR. Your contribution this afternoon has been most helpful and to the point. We greatly appreciate your participation in our hearing.

The subcommittee will analyze the statements submitted today, the testimony delivered, it's very weighty, very important, we realize the heavy economic consequences, but more importantly the safety consequences for the traveling public of the mission in which we are engaged, and we will, as soon as we get through the reauthorization work on the Airport Improvement Program, the F&E and the O&M issues that have a deadline, we will proceed to a markup on this legislation.

The subcommittee will stand adjourned.

[Whereupon, at 3:43 p.m., the subcommittee was adjourned, to reconvene at the call of the Chair.]

PREPARED STATEMENTS OF WITNESSES

STATEMENT OF ANTHONY J. BRODERICK, ASSOCIATE ADMINISTRATOR FOR REGULATION AND CERTIFICATION, FEDERAL AVIATION ADMINISTRATION, BEFORE THE HOUSE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION, SUBCOMMITEE ON AVIATION, CONCERNING H.R. 3774. MAY 1, 1990.

Mr. Chairman and Members of the Subcommittee:

I welcome the opportunity to appear before the Subcommittee today to provide you the FAA's views concerning H.R. 3774. I will be brief.

The primary thrust of H.R. 3774 is for the FAA to conduct detailed inspections of aircraft during the last year of their "economic design life," to determine (1) that they are safe to continue to be used for air transportation and (2) that inspections and maintenance carried out on such aircraft have been adequate. Unless the Administrator determines after such an inspection that an aircraft is safe to be used to provide air transportation, the Administrator is required to suspend that aircraft's airworthiness certificate.

I appreciate the intent underlying this bill, and welcome the continuing focus that it brings on the issue of aging aircraft. We all know much more today about aging aircraft than we did several years ago, and ongoing efforts are going to teach us even more. One clear lesson we have learned is that the issue of aging aircraft is one that demands and deserves the continuing attention

of the Congress, the industry, the public, and the FAA. Our fleet is, indeed, an aging one, and we must aggressively ensure its continued safety through research, analysis, surveillance, and, when appropriate, firm regulatory action. Although we certainly appreciate the added focus the bill gives to the aging aircraft issue, we do not believe that the approach contained in the bill provides us the best way to pursue advances in aging aircraft safety, and, thus, we do not support its enactment.

We are particularly concerned that the bill calls upon the FAA to perform inspections of aircraft once they have reached their economic design life. This approach presents me with both philosophical and practical problems. It would represent a fundamental change in the way FAA works to ensure aviation safety. The FAA's long-standing role has been one of regulation and oversight. The bill would substitute the FAA's own safety inspection of an aircraft for an air carrier's inspection of the safety of that aircraft, thus shifting responsibility from the airline to the FAA--probably even so far as to make the U.S. government liable for tort damages notwithstanding the government's landmark victory in the Supreme Court's Varig decision--and diffusing the airline's accountability for the safety of its own aircraft and maintenance practices. This proposed departure from traditional practice troubles us quite a bit.

The bill also presents many practical problems, which I do not believe are reasonably surmountable. To save time, I have attached to my statement a more detailed analysis, which I will briefly summarize.

The kind of inspection program envisioned by the bill would probably equate roughly to the "D" check--or the heavy structural inspection--of an aircraft, which occurs roughly every 4 or 5 years (depending on the number of landings and takeoffs of a particular aircraft). A very rough initial estimate indicates that we would need literally hundreds of additional airline maintenance inspectors, plus support personnel, facilities and equipment, to perform this work in an average year. In the first year year after enactment, such efforts are almost impossible to contemplate conducting, as we would be required to inspect over 1,000 aircraft--a task that is simply unrealistic.

Despite the steady program we have had in place for five years to hire, train, and field additional inspectors, we are still stretched too thin to devote our aviation safety inspectors to the performance of what now is an airline responsibility and task. It is already difficult for us to meet fully the challenges we face daily in today s dynamic aviation industry.

Even with the best of intent, and even with the funding necessary to hire substantially more inspectors, we could not sustain the

additional training burden that would be required to train our personnel in the techniques needed to perform safety inspections of air carrier aircraft. Our inspection personnel typically spend 8 to 12 weeks in initial FAA training to perform the types of work we currently assign them. If it were necessary for large numbers of them to be continually proficient in actually performing aircraft inspections themselves (including proficiency in performing x-ray and other non-destructive testing techniques), that training--as well as cost--would increase exponentially.

Therefore, Mr. Chairman, instead of a revolutionary change in direction, we would argue strongly for staying the current course of action we are pursuing with aging aircraft. As you know, we have tightened up the inspection processes that are followed by the carriers. We have also established, after close consultation with industry and other governmental experts, specific times for replacement of critical aircraft components in lieu of mandating more and more inspections. Those two steps represent a significant step forward.

Additionally, we are continuing to vigorously pursue additional knowledge in this area. We are working with the Navy on corrosion techniques. They are helping design a training program for our inspectors. A major focus of our R&D advisory committee is on aging aircraft. We are working hard to better understand the human factors associated with inspection techniques--information

which has not been available in the past. FAA teams, which comprise our newly formed aging fleet group, have participated with air carriers in the performance of D checks on nearly 20 aircraft. These teams have an individual looking at the human factors issues, engineers assessing the structural condition of the aircraft, and R&D personnel evaluating the effectiveness of non-destructive testing processes to determine better ways to conduct such tests. The first week of each inspection is typically spent reviewing the carrier's maintenance programs and training activities, whose effectiveness is then evaluated during the actual inspection of the aircraft, which our personnel carefully observe.

In short, I feel strongly that the agency's aging aircraft program represents the best thinking and cooperative efforts of government and industry. I am convinced we are taking the right steps and doing the right things both to ensure safety in the short-term and to enable us to pursue the right courses of action and make the right regulatory choices in the long-term. I can assure you that Administrator Busey places a very high priority on this program, and that, as we learn more about aging aircraft, we will not hesitate to take whatever additional actions may be needed to protect the flying public.

In closing, Mr. Chairman, I would like to stress my appreciation for the active interest you and your Subcommittee have taken in

this area and for the support you have given us. We look forward to working closely with you on this issue as we continue our program in this area.

That completes my prepared statement. I would be pleased to respond to any questions you may have at this time.

ADDENDUM TO STATEMENT OF ANTHONY J. BRODERICK
BEFORE THE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION
SUBCOMMITTEE ON AVIATION, CONCERNING H.R. 3774.

Jet transportation in the United States began a little more than 30 years ago. Data from one recent study shows that, since then, there have been over 8,100 civil jet transports produced in the West, which are flown by more than 400 airlines in over 130 countries. Nearly half of these are flown in the United States.

As we in the United States have been the largest market for jet transports, we have also long maintained the largest fleet. Because our air transportation system has been successful for so long, we also have the oldest fleet of the major nations, though of course the age of an individual airline's fleet is highly variable, depending on many business factors. A review of available data on some 54 large airlines operating nearly 6,000 jet transports around the world shows that just under 16 percent of their jets are more than 20 years old. Approximately 5,000 aircraft in service around the world today-- some 3,400 jets and 1,300 turboprops--are 15 years or older. Of course, as the industry continues over time, these average ages will continue to increase.

Typically, manufacturers and regulatory authorities consider three different design lives for purposes of initial design calculations, safety certification, and commercial warranties. Historically, these design lives have not been adopted by regulatory authorities as firm limits to the useful service life of a specific design, but have instead been used as points of reference for tests and calculations involving fatigue, damage tolerance, and corrosion. For that reason, most of us have come to refer to these as "economic design lives," though that term is also not strictly accurate, as history has shown. It is probably fair to say that experts stressed the word "economic" to avoid even a hint that there might be some fundamental safety significance to these figures. There is not.

Design lives vary within wide limits, and usually consider three factors. Chronologically-based design lives are typically initially chosen as 20 years, but industry practice has seen this range from 13 to 40 years. The actual number of hours a plane is flown is important; but more important is the number of flight cycles accumulated at this is the factor fatigue is based on.

For medium and long-range airplanes, initial design life parameters typically have considered 20,000 to 60,000 flights and 40,000 to 100,000 flight hours; short-range designs, on the other hand, usually have assumed between 40,000 and 100,000 flight cycles and only 30,000 to 85,000 flight hours. But these are only

initial design assumptions. As service experience grows, and additional test results, analysis, and design improvements become available, these assumptions give way to actual experience. The DC-9, I am told, in the early part of its life was given an initial assumed "economic design life" of 13 years, 40,000 flights, and 30,000 hours. Now, over 25 years later, backed by an impressive array of test data, technical inspections and analysis, a revised "economic design life" of over 100,000 flights for the DC-9 has been accepted. And I am sure more data will permit that "life" to grow further. Over 620 DC-9 aircraft are now past their original 40,000 flight "economic design life" benchmark; by one recent survey, the most active DC-9 has safely flown an average of 10 flights every day--11 on the weekends--for 24 years.

It is, thus, important for all of us to recognize that so-called "economic design lives" are not static. They change with time for any given design as real-world experience replaces original design predictions and assumptions made by the manufacturers and certification experts.

The legislation under consideration by the Committee today, H.R. 3774, would require that an aircraft be grounded upon reaching its economic design life unless it has been inspected and found safe for continued use by FAA. The proposed legislation also requires that a rule be issued to address comprehensive reviews of aircraft maintenance and other records, and requires that a comprehensive system of procedures be established to support this and future inspection activities for older aircraft.

This legislation would require the FAA Administrator to inspect every airplane in the last year of its "economic design life." Aircraft maintenance inspections have always been viewed as one of the quality control functions which are an integral part of every airline's responsibility. Shifting this new inspection responsibility from the airlines to the Federal government is a major step which we would strongly argue against for a number of reasons.

First, we would be removing responsibility from airlines--which are now trained, staffed and equipped to do such inspections--and we would instead place responsibility on a Federal government organization not presently trained, staffed and equipped to perform that work. Since the work forms only a small part of an overall airline maintenance program, updates in state-of-the art training, testing and measurement would be expected to continue. Contrast that picture with a Federal government inspection bureaucracy which would have to be created to assume this industry function. It is difficult to see how, in the real world, this new government inspection corps would be able to equal the industry's performance without large infusions of funds over those needed by

industry for the job. Certainly, given the present growth difficulties FAA is experiencing in the inspection area--in recruitment, retention, training and funding--it is simply unrealistic to expect the Federal government to be capable of assuming such a large task within the next 5 years.

A second problem we see with language requiring that the Administrator perform these inspections is the major shift it permits with regard to tort liability arising from aircraft accidents. The Supreme Court, in its landmark decision in the Varig case, concluded that the FAA's responsibilities cannot be viewed as anything but discretionary "spot checking" to ensure that airlines are fulfilling their responsibilities to operate to the highest standard of safety. As written, H.R. 3774 changes that discretion and requires a comprehensive government inspection to determine that every older aircraft is safe for use in air transportation. The shift in tort liability that this language causes is dramatic. The taxpayers could be expected, following future accidents, to be exposed to literally billions of dollars of tort liability. Rightly or wrongly, such actions will inevitably be pursued by plaintiffs in virtually all cases, as they seek to best recover damages, and, as a minimum, the U.S. could be expected to be involved in protracted litigation.

Third, the relative safety improvement we can expect from FAA safety inspections, at best, appears small, compared to alternative uses of the substantial resources that this legislation would command. As you will gather from this testimony, we see only a small potential reduction in exposure to risk that would flow from H.R. 3774. But the resource demands of this legislation are significant. This legislation would require detailed inspections on perhaps 1,200 jet aircraft within the next year or they would be grounded. Hundreds of inspectors, plus associated support staff, as well as additional training and facilities, would be required to carry out this work. It is likely that we would need an airline maintenance inspector staff nearly twice what we have now. We are not convinced that redeploying resources in this manner is justified.

I would like to turn now to a discussion of some of the substantive issues covered by the proposed legislation.

Decades ago, aircraft maintenance was viewed mainly in terms of overhaul intervals. Piston engines and aircraft were used in service for relatively short periods of time, then taken out of service and completely overhauled to a nearly new condition. As designers produced vastly improved reliability, our understanding of how to best do maintenance improved. Working with design and maintenance experts, FAA developed and currently uses what is

called a continuous maintenance philosophy.

Using the basic technical and risk analysis framework referred to as "MSG 3"--after the third "maintenance study group" revision of these guidelines--each airplane model is provided a custom tailored maintenance program for initial introduction into service. This program is developed by an FAA chaired "maintenance review board" or MRB, and details the required maintenance action and required inspection interval for every part in every airplane. These prescribed maintenance actions and intervals are carefully reviewed and fitted into progressively more detailed and time consuming maintenance checks performed at intervals ranging from before every flight (the "walkaround" preflight inspection) to heavy maintenance checks typically performed at annual or biennial intervals (usually called "C" checks) or at roughly 4 to 5 year ("D" checks) intervals.

Each maintenance or inspection action and interval is based on the technical principles of MSG-3 and the MRB report for the individual airplane model. As experience is gained, better inspection techniques are specified in airline maintenance programs or by airworthiness directives, and initially defined maintenance intervals are adjusted up or down.

H.R. 3774 creates a new inspection requirement which does not have the detailed engineering and analytical basis of current inspection programs. It is an inspection whose basis cannot be derived from within the MSG-3 logic or the MRB report, and as such presents the real possibility of becoming counterproductive. This is so because the inspection provides a unique economic--but not a safety--waypoint in an airplane life.

Should H.R. 3774 become law, we would expect many airlines to spend considerable resources reviewing and rescheduling progressive maintenance to reschedule as much heavy maintenance as possible to the new inspection time. This would tend to be a step backwards, toward the old "overhaul" concept. But it would be attractive because it would tend to leave economic options open; airlines could elect to "run out" the "economic design life" of their aircraft and then sell them or, depending upon the economics of the moment, perform the required overhaul and return the aircraft to service. Either way, major maintenance actions would have been postponed so that could all be done more efficiently, at once. Such counterproductive effects are certainly not inevitable, but they should be expected because of the economic significance of the proposed new inspection interval.

It is worthwhile to note here that the absence of an enforced retirement or major inspection at the end of a certified "economic design life" is itself well founded in the technical aeronautics literature. Studies over the years by both military and civil

aeronautics specialists have convincingly demonstrated that there is no technical basis for enforcing a single life concept on a real world airplane.

A single piece of metal has a predictable fatigue or corrosion life. A simple structure composed of a few connected interdependent pieces, all made of the same material by the same designer, might also have a predictable useful life, but prediction of which part will break or corrode first in actual use is more difficult. With thousands of different parts made of dozens of different materials, designed by hundreds of different designers, it is clear that accurate prediction of the safe useful life of an entire airplane structure is not possible because of the nearly infinite number of interdependent structural interactions. This is then further complicated by design economics, when it may be appropriate to design a part to be replaced at the end of an airplane's "economic design life," but other components are seen in service to last far longer.

All of these interacting factors must also be viewed with the realization that the original estimates of design life predict far into the future. These predictions are subject to the inaccuracies and imprecision inherent in the science of aeronautics. When reviewing all of these factors, scientific study and three decades of safety experience has shown that maintenance attention paid to every individual part is the key to safe structural maintenance programs. System-level analyses of airplane structures can serve a useful function, but we are not yet able to use them to significantly improve upon the progressive continuous maintenance programs presently in civil use. To require that airplanes be grounded unless such a review is conducted at a time based on relatively imprecise calculations performed 20 or 30 years earlier cannot be defended on technical grounds.

We are not ignoring the importance of conducting more research and technology development in our attack on the aging aircraft problem. We are working closely with scientists and experts from NASA, the Department of Defense, academia and industry to develop and carry out a comprehensive program of research addressing all issues of importance to aging aircraft. Of course, we are taking a hard look at structural analysis and other methodology in efforts which may help integrate lower-level data into useable system level analyses. We are also focusing quite heavily on nondestructive inspection, both in developing new techniques and in attempts to rapidly transfer existing space-age technologies to the maintenance shop floor. We hope for some relatively short-term benefits in the latter area. But it is in the area of human factors that we are really anticipating state-of-the-art gains. This is an area where the ground is largely unplowed. We need to emphasize, for example, development of better workplace environmental standards (lighting, workstands, etc.) and better

inspection techniques to reduce fatigue and mistakes that arise from boredom or simple inattention to basic human comfort needs in the workplace. We are developing better guidance for job training (both for FAA inspectors and airline maintenance personnel). Perhaps most of all, we are hard at work improving communications at all levels--from basic service difficulty data reports through maintenance and inspection instructions on up to better airworthiness directive explanations, and instructions for compliance with them. The promise for advancement in these areas is great, because of the undeveloped state of basic human factors information as it relates to aircraft maintenance. That lack of existing information cannot be permitted to reduce the urgency of filling the void.

As this Committee well knows, from its oversight hearings in the past two years, the FAA has moved with force and aggressiveness to erase the shadow cast by the Aloha tragedy. FAA actions promptly signalled a clear change in maintenance philosophy, from one of reacting to structure damaged by age to one which puts full force into efforts to prevent that damage by replacing aging structure before cracks develop. These actions have been characterized by a palpable change in the attitudes of all those in the aircraft structural maintenance community. These changes began at the first International Conference on Aging Aircraft which we hosted in June 1988, and have carried through the second, held last year in Baltimore. Just a few weeks ago, Mr. Chairman, in your keynote address to our aircraft structures conference in Atlanta, you outlined 8 important steps we must take to continue these efforts. I am pleased to confirm that our operational changes and ongoing research will vigorously pursue and implement the results of projects addressing each of those points.

Results to date in the cooperative international government/industry "aging aircraft" program are real, and are already being incorporated into airline fleets. Mandatory changes to aircraft structures, inspection programs, corrosion control programs, and inspection-related human factors are flowing from these efforts at an ever-increasing rate, and providing substantial reductions in exposure to risk for the traveling public even today. According to one recent report, one major U.S. airline planned to expend about 13,000 hours for a "D" check on one of its aircraft in 1987. This year, it had budgeted 35,000 hours for the same model, but aging aircraft work demands and related FAA mandated structural changes will likely push that model's maintenance requirement up to 45,000 labor-hours for a "D" check by the airline.

This increased attention to maintenance is welcome and will provide real safety improvements. But it is also cause to move cautiously. We must do all we can to avoid mandating maintenance requirements that we have not been able to identify with an

associated increase in real safety. The current shortage of U.S. maintenance facilities, trained airline mechanics, and even FAA inspectors dictates that we employ those resources where they are clearly and unarguably most productive. We are not convinced that this would be the case if we were to deploy these limited resources to undertake the additional inspections called for by H.R. 3774.

Statement of Robert E. Doll
Vice President - Engineering & Quality Assurance, United Airlines
and Chairman, Airworthiness Assurance Task Force
Before the House Public Works and Transportation Committee
Subcommittee on Aviation
On Aging Aircraft/H.R. 3774
May 1, 1990

Good morning Mr. Chairman and members of the Subcommittee.

My name is Robert E. Doll. I am Vice President of Engineering and Quality Assurance for United Airlines.

Since June 1988 I have chaired the Airworthiness Assurance Task Force (AATF), a task force assembled by aviation industries and airworthiness authorities to examine the repercussions of the tragic failure which struck an Aloha Airlines Boeing 737 aircraft two years ago. Joining me at the table today are other members of the AATF Steering Committee: C. Julian May, Senior Vice President of Technical Operations for Delta Air Lines; Benjamin A. Cosgrove, Senior Vice President, Boeing Commercial Airplane Group; Dale S. Warren, Vice President Deputy General Manager for Quality, Business and Technology Development, McDonnell Douglas Corporation; and William W. Hoover, Executive Vice President, Operations and Safety, for the Air Transport Association of America.

We appreciate the opportunity to appear today to briefly report on the status of AATF initiatives and, importantly, to discuss H.R. 3774, The Aging Aircraft Safety Act of 1989.

This Subcommittee and all of us in the industry continue to confront the full range of issues related to aging aircraft. We recognize the high priority that exists for appropriate action by the industry to assure the airworthiness of the fleets now in operation and of future fleets. You and others in Congress have been most helpful in supporting and commending the work of the Task Force, working in cooperation with the Federal Aviation Administration (FAA).

Among the key questions that must be answered are:

- Can aircraft fly indefinitely under maintenance programs incorporating the newly instituted AATF actions?
- Will FAA surveillance be adequate?
- Are all operators fit to provide adequate maintenance?

As you know, the AATF has addressed these aging aircraft challenges, drawing upon the best resources of industry, government and academia to define a comprehensive, aggressive response program. We have established a program with a six-layer safety net, with which you are familiar. The focus of this hearing is on H.R. 3774 and, therefore, we will not report to you in detail about the ongoing work. A complete report of

the status of these efforts is attached for your information (Attachment A). However, we would like to provide a short recap of its major elements:

- Key structural service bulletin airplane modifications have been mandated by regulation, and compliance is under way;
- New industry corrosion-control standards have been established, and mandatory compliance with this program has been proposed by FAA for Boeing aircraft, and similar programs for other aircraft will follow in due course;
- A comprehensive review of all previous structural repairs will be made and measured against upgraded repair standards;
- Recommended maintenance program guidelines are being updated, and corresponding manuals revised; and an advisory circular incorporating these principles will be issued;
- The supplemental inspection program for monitoring aging aircraft is being updated, incorporating knowledge that has been gained in recent experience; and
- The system for collecting, analyzing and disseminating maintenance information will be streamlined and modernized in short-term and long-term phases.

Turning now to H.R. 3774, this legislation directs that FAA initiate rulemaking to focus on aging aircraft issues. Section 2 requires FAA to initiate a rulemaking proceeding to require an

FAA inspection of each aircraft in the last year of its economic design life, or within one year after the issuance of a regulation to establish such inspections. It also requires FAA to conduct a one time review of maintenance records during that last year, and it requires air carriers to make the aircraft and the corresponding maintenance records available to FAA. Section 2 also obligates the air carrier to demonstrate the integrity of age-sensitive parts for further service following such inspections. And it requires the FAA to establish a continuing program for reviewing and evaluating aircraft on a periodic basis after its economic design life. Finally, Section 2 requires the establishment of procedures for determining the economic design life of aircraft, as well as the procedures for conducting the reviews of airplanes and maintenance records.

Members of the Airworthiness Assurance Task Force have had ongoing and useful discussions with you, Mr. Chairman, over the past year on aging aircraft issues. We have carefully reviewed H.R. 3774 and respectfully offer our additional views. Beginning with the proposed requirement for an FAA inspection of each aircraft during the last year of the aircraft's economic design life, we are concerned that a one-time inspection conducted by FAA could create a rippling impact on the resources of FAA and the airlines that could impinge on other airworthiness responsibilities of both segments of aviation. Such an inspection, if it is to be interpreted as a

recertification of the integrity of the airplane, would raise certain questions as to FAA's increased liability resulting from an exclusive, first-hand inspection of every aircraft. These questions would compel FAA to perform the inspections in such depth as to require extensive disassembly and exhaustive inspection by visual and other means. A process of this nature could lead to repair costs so great as to provoke the premature retirement of airworthy airplanes.

Even if the airplanes are not forced out of the fleet by such costs, they could be expected to sit at maintenance docks for extended periods for the FAA reviews of hardware and records. The operator would have no control over the urgency assigned by FAA to the completion of the inspection. While the valuable, scarce dock space is committed to the required inspections, other, important airworthiness work would have to be deferred. We understand that GAO has estimated that 1200 aircraft would be brought into this inspection process within a year or so after H.R. 3774, if enacted, would go into effect. Because of unavailable maintenance facilities and inadequate industry and FAA manpower resources, many of those airplanes would have to be taken out of scheduled service, resulting in a significant shortfall of capacity and an inability to respond to public demand for service.

In order for FAA to staff an adequate team of inspectors for such an effort, substantial diversions of the inspector workforce from the current inspection program would be required, leaving many other important airworthiness checks unfulfilled.

We believe that the continuous inspection and maintenance concept being embraced by the AATF is consistent with the goal of H.R. 3774. Continuous maintenance includes light, medium and heavy maintenance at various intervals - the lighter maintenance taking place at more frequent intervals. The intervals are selected so that several opportunities are provided to find and repair damage before airworthiness is impacted. With the six new safety nets being deployed by the AATF, the industry and FAA representatives are confident that the continuous maintenance approach will guarantee good results.

I shift now to the issue of inspecting the maintenance records at the end of the economic design life. It is extremely important to review maintenance records when the aircraft changes maintenance programs, as when it is transferred from one airline to another. Such record reviews, supplemented by periodic internal quality audit reviews and FAA inspections, assure a continuous verification of the records. Any flaws in the records must be discovered as soon as possible after they occur to assure airworthiness and accountability.

Turning to the definition of "economic" design life, we believe that such a definition would be extremely difficult to fashion. The deterioration of some parts of the airplane is sensitive to flight cycles; other parts are sensitive to flight hours; still others are sensitive to calendar time. We have found that the most meaningful way to monitor the variations of this type is through the continuous maintenance concept whereby components are examined again and again to detect deterioration of any type.

We believe that technical criteria should be used as an airworthiness reference rather than an economic indicator. This approach seems more consistent with your goals, and is consistent with the objectives of the AATF.

Mr. Chairman, we appreciate your leadership on aging aircraft issues and the spirit in which H.R. 3774 has been advanced. We think it is prudent to set a program in place to assure that the industry stays ahead of the aging aircraft problem as additional aircraft types mature.

The industry, in cooperation with FAA, is taking extraordinary steps to respond to the full range of aging aircraft questions. We hope you will give full consideration to our alternative recommendations.

First, we recommend institutionalizing the Airworthiness Assurance Task Force process. The FAA Administrator should establish a permanent committee representing government and

industry to review, on an annual basis, the effectiveness of previous individual fleet actions. Such a committee should also establish fleet level working groups, on a schedule approximately 15 years following introduction of the fleet into service, to review structural modifications, corrosion history and repairs of that fleet, and to make appropriate recommendations following that review.

We also believe that there is a need to assure that the steps necessary to establish the airworthiness of the aircraft have been taken. Therefore, the AATF recommends action by the FAA Administrator to require each operator to certify that each aircraft is airworthy for operations extended past the 4-D check and at subsequent D checks; and FAA should verify that the operator has maintained the aircraft in accordance with approved maintenance programs and that it has participated as required in the airframe inspections for that aircraft. The FAA should utilize an audit process to verify maintenance programs and airplane condition.

The actions that we are recommending for FAA are going to require the FAA inspectors to have special skills in dealing with symptoms of corrosion and metal fatigue. Accordingly, we recommend that FAA establish a training program designed to furnish FAA inspectors with the skill necessary to conduct "hands on" inspections of these phenomena.

We believe that the continuous maintenance concept, including an effective internal quality audit program, is the most efficacious approach to airworthiness assurance. We are concerned, however, that new air carriers, because they have no experience base upon which to validate their quality audit programs, require closer FAA scrutiny than is currently being given. We recommend that FAA strengthen the requirements for new operators to demonstrate their technical abilities and commitment to airworthiness assurance.

Finally, the foregoing recommendations if acted upon can only be effective if FAA is provided the resources to meet the challenges placed before them. As always, we seek your help and the help of this Subcommittee in assuring that Congress provides FAA funding and staff resources sufficient to enhance aviation safety and efficiency.

Mr. Chairman and members of the Subcommittee, this completes our prepared statement, and we would be happy to respond to your questions at this time.

Thank you.

ATTACHMENT A

A REVIEW OF THE WORK OF THE AIRWORTHINESS ASSURANCE TASK FORCE

Robert Doll, United Airlines and Clyde Kizer, Midway Airlines

It is a great pleasure to be invited to address this important meeting. Clyde and I have been involved with the aging aircraft efforts right from the start at the International Conference on Aging Aircraft held in June of 1988. It has absorbed a large amount of our time and our effort but we both share the thought that there is nothing happening in our business today that is more important to our business than working with the government agencies who will write the laws and regulations for the maintenance of our aircraft.

BACKGROUND OF THE AGING AIRCRAFT ACTIVITY

In April of 1988, when an Aloha B737 had its dramatic in-flight structural failure, the media and the public around the world discovered aging aircraft.

It has been many years since any advance has come along to significantly increase the productivity of our current aircraft types. Factors such as the cost of fuel burned, three man crews, or noise abatement, coupled with increased maintenance costs generally do not result in an economic decision to replace older aircraft types at this time.

Further, traffic is booming and almost all new aircraft deliveries are being pressed into service to provide increased capacity to meet passenger demand. Those of us who are responsible for the design and planning of maintenance programs for commercial aircraft knew that our fleets were growing older and, at the time of the Aloha accident, had been taking action to assure the continued airworthiness of our aging fleets.

We have no choice but to maintain our older fleets in a safe, airworthy condition until economic factors allow their replacement. In general, airline maintenance programs are up to that challenge.

The industry had been responding to increased maintenance demands of the older fleets by increasing planned out of service time. We also were active in reviewing service bulletins and AD's for terminating actions as the non-routine work generated during routine maintenance checks was increasing directly with the age of our fleets.

Our objective was to terminate those required inspections that had a high probability of a negative finding upon inspection. A negative finding, of course, required a repair, replacement,or modification of structure and usually led to a late release from the planned maintenance period, thereby jeopardizing our flying schedule.

A good example of such a decision at several airlines is the decision to terminate inspections of Section 41 of the B747 by replacing the structure in that area. When we found that the probability of finding structural defects was quite high, particularly in hard to access areas such as behind the engineers panel, the decision was made to put B747s out of service on a planned basis in order to accomplish terminating action in that section of the aircraft.

We felt that we had a good understanding of the problems that were developing on our aging aircraft fleets.

However, when the Aloha B737 had its inflight structural failure, our business changed. We may not have realized it instantly, but as the weeks passed in the Spring of 1988, it became apparent that we were in grave danger of losing control of the management of our maintenance programs.

At the time, it was widely feared that the United States Congress, prompted by an inflamed and mostly uniformed media, would force the FAA to take actions that, at worst, would immediately ground all aircraft over some arbitrary age and, at best, would force a legislated "standard" maintenance program on all operators. We were certain that a legislated maintenance program would be so encumbering that it would be impractical to work in day to day practice and would not improve the airworthiness of the aging fleets.

Incidentally, the danger of encumbering legislation is not behind us in spite of the work the industry has done through the Airworthiness Assurance Task Force. We will review the current "public" climate later on in our discussion.

Perhaps a review of the events since the Aloha accident will be useful for those of you who are not familiar with the history of our effort in the Airworthiness Assurance Task Force and will serve as a valuable refresher for those of you who are familiar with our work.

INTERNATIONAL AGING AIRCRAFT CONFERENCE, JUNE 1988

On June 1, 1988, the FAA convened its first conference on aging aircraft. It was an open meeting held in Washington D.C. and experts from all over the world in the fields of aircraft structures, non-destructive inspection, human factors, and engines were invited to attend and participate.

In his opening remarks, FAA Administrator Allen McArtor made several points to set the stage for the subsequent conference discussion groups.

Mr McArtor made the point that the FAA and industry have been addressing the aging aircraft issue for at least twenty years:

- o in 1968 the FAA formed an advisory panel on the airworthiness of pressurized, older aircraft,

- o in 1978 the FAA adopted new damage tolerance rules and advisory material that became the basis for the Supplemental Inspection Documents adopted by Advisory Circular in 1981,

"However, recent events [the Aloha accident] have caused us to reevaluate our efforts to see if new technology is available or can be stimulated through research," he said.

He saw the aging airplane issue as international issue and called for cooperation from all manufacturers, international operators, and international airworthiness authorities in an effort to evaluate past practices and policies and to be "free thinkers" on things that might be done to improve the safety of aging airplanes.

The Honorable James L. Oberstar, Chairman of the Subcommittee on Investigations and Oversight in the U.S. House of Representatives also addressed the Conference. In his remarks, Chairman Oberstar said:

"This conference reflects a clear recognition that the U.S. civil aviation fleet is growing older, and that aging aircraft represent one of the most serious challenges to the civil aviation community and the FAA in recent years. The convening of this group of international experts to exchange ideas and information over a three day period is a positive, constructive step that will produce beneficial results far into the future."

"This conference is both a recognition that government and industry need to work together on this problem, and a commitment to do so vigorously. The international nature of the conference reflects the reality that air travel has shrunk the world, diminished the meaning of international boundaries, and drawn all mankind, with its opportunities and problems, closer together."

"The basic question that must be asked and, hopefully answered in the course of this conference is: Do aircraft, with proper maintenance have an indefinite life span or can the FAA, the carriers, and the manufacturers agree on a definition of useful life for a given type and model of aircraft?"

"This conference needs to ask, and answer:

- What is the responsibility of the aircraft manufacturers to track the fleet that they build?
- What is the responsibility of the carriers to aggressively maintain that fleet in the safest possible condition?
- What is the responsibility of the FAA from approval of design itself, and surveillance of maintenance conducted by the airlines?"

"This conference should identify and define the inspection and detection deficiencies or failures which have eluded our human frailty and which need more refined attention and action."

The challenge from Congressman Oberstar was clear.

During the conference, the representatives from ATA, AIA, IATA, AECMA, etc. who were in atterdance, caucused frequently. The result was an eight point set of recommendations presented to the FAA and accepted by them as a constructive outcome of the conference .

THE AATF CHARTER

The joint Airline/Manufacturer recommendations were:

1. Continue to use our present system of maintenance and inspection with diligence and thoroughness. Find out why a single aircraft suffered major structural failure and adjust the system as necessary.

2. Initiate research to find better ways to assess structural condition and detect structural problems.

3. Continue to pursue the concept of teardown of oldest aircraft to determine structural condition, and conduct fatigue tests of older airplanes.

4. Pursue transfer of the currently available body of knowledge of NDT and its application to aircraft inspection.

5. Put R&D money into improving NDT techniques and methods.

6. Examine all aspects of Human Factors involved, including training and qualification of airline inspectors.

7. Ensure that the communications systems between airlines, manufacturers, and the FAA are adequate.

8. Establish task forces from the airlines, manufacturing industry, FAA, and NASA to continue the work begun in this workshop.

The ATA offered to initiate the process of forming a committee to steer the industry efforts in meeting the goals of the conference, the challenges presented by Administrator McArtor and Congressman Oberstar, and carrying forward an action program to implement the recommendations made by the Airline/Manufacturer caucus and the aging aircraft conference.

The first meeting of the Airworthiness Assurance Task Force Steering Committee was held in Washington D.C. on August 12, 1988. The composition of the Steering Committee was determined and Task Group efforts were identified.

The Steering Committee is composed of the following people and organizations:

Chairman, Robert Doll, United Airlines
Julian May, Delta Airlines
Ade Hale, American Airlines (David Kruse)
Jean-Yves LaLanne, Air France (IATA)
Dale Warren, Douglas Aircraft
Ben Cosgrove, Boeing Corporation
Peter Bashford, British Aerospace (AECMA)
Roger Lecomte, Airbus Industrie
LeRoy Kieth, FAA
William Withycombe, FAA (Ray Ramakis)
David James, CAA (JAA)
Sam Venneri, NASA
David Wadsworth, PAMA
William Hoover, ATA (Clyde Kizer)

The original Steering Committee members are listed in parentheses. David Kruse of American Airlines named Ade Hale as his replacement, Ray Ramakis retired from the FAA in November of 1989, and Clyde Kizer is now with Midway Airlines. Playing a significant role in Task Group activities over the past two years are:

Richard Johnson, Boeing,
Amos Haggard, Douglas,
Al Voeller, American,
Bert Terrell, Delta,
Roger Casterline, United,
Mark Smith, United,
Jess Lewis, FAA and
Edmond Boullay, DGAC

The Steering Committee established six task groups to meet the objectives established as a result of the conference.

AIRFRAME MAINTENANCE PROGRAMS

Three groups were formed to deal with the technical maintenance problems associated with specific fleets. They are the Boeing, Douglas, and International Manufacturers Task Groups. They were asked to consider, for each aircraft type:

- o termination of structural service bulletins,
- o corrosion prevention and control programs,
- o review of the SSIDs,
- o repair assessment and documentation, and
- o maintenance program design.

RESEARCH and DEVELOPMENT

A Research and Development Task Group was established to study and make recommendations concerning information gathering on the "state of the art" and technology transfer in the areas of NDI, fatigue testing, and structural analysis.

HUMAN FACTORS

A Human Factors Task Group was established to help coordinate industry efforts and FAA efforts regarding human factors in the maintenance process.

COMMUNICATIONS:

A Communications Task Group was established (now called the International Airworthiness Communications Committee) to examine the global problem of data gathering, analysis, and feedback of operations and maintenance events that may have significance in the early detection of fleet reliability and safety problems including a short term study of the Service Difficulty Reporting system employed by the FAA today.

THE TECHNICAL OVERSIGHT GROUP re AGING AIRCRAFT

Concurrent with the establishment of the AATF Steering Committee, The Department of Transportation engaged Dr. Jim Mar from the Massachusetts Institute of Technology, a well known expert on aircraft structures to form an independent group of experts to advise the FAA on aging aircraft activities. He named his group "Technical Oversight Group re Aging Aircraft (TOGAA)." The charter of his group from the DOT and the FAA was to:

Define the scope of, and, assess, those issues such as design, fabrication, inspection, maintenance, repair, regulatory, and management that pertain to the structural integrity and continuing flight safety of aging aircraft.

Make recommendations for timely actions to enhance the safety of the aging aircraft fleet.

Review and provide guidance to the FAA aging aircraft R&D program.

Dr. Mar named to his group:

Jack Lincoln, USAF,
Warren Stauffer, Lockheed (Ret),
Tom Swift, FAA,
Dick Tabery, United Airlines (Ret),
Jim Taylor, University of Southern California,
Martin Taylor, Continental Airlines (Ret), and
Chuck Tiffany, Boeing Military (Ret).

The TOGAA is supported by Jess Lewis from the FAA and Pin Tong from the Department of Transportation.

STATUS OF AGING AIRCRAFT ACTIVITIES, MARCH 1990:

UNITED STATES CONGRESS:

The Hon. Tom Lewis, Representative from Florida has proposed legislation that would require the Administrator of the FAA to:

"develop ..... a management plan to facilitate effective and continuous communications ..... for prevention of defects, failures, and malfunctions in products, parts, processes, and articles ..... which could result in the catastrophic failure of an aircraft."

In the introduction to his Bill, Mr. Lewis states:

"The American Public is tired of tombstone technology - instant programs, task forces, studies, and other after the fact actions to prevent another accident like the July 19 [1989] crash landing of flight 232 [United Airlines, Sioux City, Iowa] ..... it is not reassuring to know that there may be other types of preventable catastrophic accidents that are still flying."

Mr. Lewis held hearings in Washington D.C. early in March on this legislation and he is revising the Bill but intends to press ahead for Congressional action in the near future.

Of more immediate concern is the legislation introduced by the Hon. James Oberstar, Chairman of the House Aviation Sub-Committee. His proposed legislation would require that:

"The [FAA] Administrator shall issue ..... an order suspending an airworthiness certificate of an aircraft ..... on the last day of the economic design life of an aircraft or the last day of the 1-year period beginning on the effective date of this [legislation] ..... unless the Administrator determines, after an inspection of the aircraft, and an investigation of the inspection, maintenance, and other records pertaining to the aircraft, that the aircraft is safe to be continued to be used to provide air transportation."

If this Bill is passed in its present form, all aircraft over the "economic design life," an age to be determined by the FAA, will not be able to fly until they are inspected by the FAA (an inspection that will require a complete stripping of the aircraft inside and out) and until all pertinent records are examined by the FAA!

All aircraft currently over the FAA determined age would be grounded one year after this legislation is passed until the FAA can complete their inspections and verifications.

If we assume that for the purpose of the legislation, that the FAA chooses a life equivalent to the "economic design life" established by the manufacturers at the time the particular aircraft was designed, there will be over 1300 aircraft in the United States fleet alone that exceed their "economic design life." [GAO statistics as of July 1989 show 1241 aircraft in the U.S. fleet over 20 years old].

It is hard to imagine where the FAA would find the resources that would needed to avoid grounding a significant number of aircraft one year after this legislation passed Congress. It is also not clear what the implications would be on fleets that operate into the United States under other regulatory agencies if this legislation should become law in the United States.

As we will discuss in a few minutes, the AATF is trying to work with Congressman Oberstar to suggest revisions to the draft legislation that will satisfy the public's concern for the airworthiness of aging aircraft and at the same time, will minimize potential disruptions to commercial service.

GENERAL ACCOUNTING OFFICE:

The General Accounting Office, at the direction of Congress and the Secretary of Transportation has recently completed a study of "the FAA's efforts to ensure the safety of the nation's aging aircraft fleet" and is completing studies of the FAA Airworthiness Directive process, repair station capacity, and the FAA's Service Difficulty Reporting (SDR) System.

In the cover letter to the Secretary of Transportation, the GAO summarized their findings and recommendations. Excerpts from that letter:

"While many encouraging initiatives are underway to meet the aging aircraft challenge, FAA needs an overall plan describing current or anticipated corrective actions, including appropriate resource and time requirements. We believe a comprehensive plan is necessary to ensure coordination and accountability for identifying and implementing solutions to the aging aircraft problem. FAA also has several opportunities to work more actively with the aviation industry to ensure that the aging fleet's need for federal inspection is adequately met by the FAA's inspection work force."

"As a result of the April, 1988 Aloha Airlines tragedy, FAA sponsored an international conference on aging aircraft in June 1988. In our opinion, this conference provided a clear statement on the aging aircraft problem and developed a reasonably complete series of recommendations."

"We believe that the critical nature of the aging aircraft issue demands that a plan be developed within which FAA could (1) coordinate the timing and results of current and future initiatives and (2) evaluate and incorporate the resource implications of those initiatives. For example, some FAA officials say that without an overall plan, analysts working in the Navy, National Aeronautics and Space Administration (NASA), FAA, and the private sector could be unaware of the timing and results of each other's work. In addition, a plan would facilitate oversight of many long-term, government/industry initiatives spawned by the June 1988 conference - such as recommended modifications of Boeing and McDonnell Douglas aircraft - and would allow the Congress to promote more accountability with FAA and the industry."

"FAA has several opportunities to work more actively with industry in addressing maintenances problems associated with aging aircraft and, in the process, use the agencies resources more effectively. These opportunities are (1) studying approaches to achieve more direct hands-on aircraft inspection to supplement its paperwork review of maintenance records, (2) analyzing trend data on aircraft maintenance and repair so that FAA inspection resources can be allocated better, and (3) dealing with the emerging problem of capacity shortage in the aircraft repair industry and the implication this might have on the FAA inspection work force....."

"Therefore, consistent with the conclusions we reached, we recommend that you direct the FAA Administrator to

- o develop a plan describing present and anticipated actions to meet the aging aircraft challenge, their time frames, and the resources necessary to complete these actions and

- o report periodically to the Congress on the progress toward accomplishing the plan's goals."

Current speculation is that the GAO will be critical of the Airworthiness Directive process as being too cumbersome or slow to respond to the need for directives to the industry, and that they will also be critical of the SDR process as being ineffective in notifying the industry of significant incidences and trends.

TECHNICAL OVERSIGHT GROUP re AGING AIRCRAFT

TOGAA has been very active, meeting on a monthly basis since its formation in October 1988. The group has conducted their meetings at sites of interest to them including FAA Headquarters, FAA Northwest Region, FAA Tech Center, Boeing in Seattle, Douglas in Long Beach, Lockheed in Burbank, United Airlines in San Francisco, Piedmont Airlines in Charlotte, and the AATF Steering Committee at various sites around the USA.

The most significant action of the TOGAA to date, in terms of immediate impact on our operating fleets, is a pending NPRM now being prepared by the FAA for the B727. TOGAA is concerned about the potential of disbonded joints on the B727 that might lead to multisite damage. The NPRM will call for an ultrasonic inspection of all lap joints on aircraft manufactured using the cold bonding process and a potential acceleration of terminating action on all lap joints with skin thickness less than .056.inch. The AATF is maintaining close contact with TOGAA to assure complete discussion of important issues before final actions are recommended by the FAA.

The TOGAA is also working closely with the FAA in developing an effective R&D program for aging aircraft concerns.

AIRWORTHINESS ASSURANCE TASK FORCE

The GAO, in their December 22, 1989 report to the Secretary of Transportation, included as Appendix III a "Summary of Actions in Response to Conclusions and Recommendations Made at Aging Aircraft Conference"
that summarize Task Force activities as seen by the GAO. Copies of the GAO report can be made available to you through IATA if you are interested.

The GAO did say in Appendix III that, in its opinion, the formation of the AATF was "perhaps the most important action to have come out of the conference. FAA's adoption of the task force recommendations has signaled a major shift in the agency's philosophy regarding inspection versus parts replacement. The task force envisions no obstacles to maintaining the task force at this time.

Airframe Maintenance Programs

As mentioned earlier, three groups were formed to deal with the technical maintenance problems associated with specific fleets. They are the Boeing, Douglas, and International Manufacturers Task Groups. They were asked to consider, for each aircraft type:

- o termination of structural service bulletins,
- o corrosion prevention and control programs,
- o review of the SSIDs,
- o repair assessment and documentation, and
- o maintenance program design.

Thirty two domestic, and fifty two foreign airlines have participated in the AATF working group activities. Representatives of airworthiness authorities from five countries joined the major airframe manufacturers and the US Air Force, the US Navy, and NASA to form action recommendations in each of the areas of consideration.

As of March 15, 1990, status of the AATF Working Group activities are:

Termination of Structural Service Bulletins:

The review of service bulletins for termination has been completed and submitted to the appropriate airworthiness authority by the Boeing, Douglas, and British Aerospace Working Groups. Work is essentially complete for Lockheed and Airbus fleets. Fokker is still working in parallel with their corrosion program recommendations.
The FAA has issued AD's for the Boeing fleets and will complete the AD's for Douglas fleets in the near future.

Corrosion Prevention and Control Programs:

Recommendations for new maintenance requirements for corrosion control and prevention have been submitted to the FAA for the Boeing and Douglas fleets. Airbus and Lockheed recommendations are in final review and will be submitted shortly to the appropriate authority. The FAA has issued the NPRM for the major Boeing fleets.

Review of the SSIDs:

General discussion has been held as to approach. This activity has been scheduled behind the other activities in all of the working groups.

Repair Assessment and Documentation:

The consensus of the working groups is that existing structural repairs on aircraft that were certified before FAR Part 25, Amendment 45 be reviewed considering damage tolerance concepts afforded by Amendment 45 standards. The intent of the repair review program is to remove the ambiguities of the past thirty years. The result will be to bring a uniform level of safety across each fleet.

Repairs will be classified into one of four categories. Each category will have a prescribed course of action to maintain the inherent damage tolerant capability of the aircraft. The possible range of actions will range from "no action" if the repair design is equivalent to the original structure, to special inspections, to immediate removal before next flight. Since every repair will be reviewed and documented, this program will provide a higher level of tracking and control than has ever been possible in the past.

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The AATF will recommend that the FAA mandate a time period for the completion of the repair review program. If the review is not completed within the required time period, we will recommend that the FAA penalize the carrier. We will recommend compliance periods to the FAA for each aircraft type.

Our target for the repair review program for all manufacturers is 1991. We have requested that the FAA consider administering this program on a non-violation basis to assure the most effective documentation of the actual condition of the operating fleets.

Maintenance Program Design:

Representatives of the Working Groups met at the end of January to develop a discussion position to be used to develop an Aging Aircraft Structural Maintenance Document. Subsequent meetings have been held and a position paper is evolving. Topics being studied are: phasing of checks, skills, training, structural sampling (other than SSID), interval reductions, high/low utilization differences, lease/merger/sales impacting "ownership" of airplanes, contract maintenance, audit responsibilities of owner/operator/manufacturer/regulators, organization and program parameters.

When a program is developed by the representatives of the Working Groups, full Working Group meetings will be held to assure agreement across the industry. Recommendations will be submitted to the all concerned regulatory authorities. It is anticipated that the FAA will issue an Advisory to all U.S. operators and that the program guidelines will be used by PMI's in the U.S. to assure consistency of programs across the industry while allowing the individual operator to retain responsibility for his own maintenance program evolution from the MRB.

Our target for completion of the program recommendations and submission to the appropriate regulatory authorities is early 1991.

RESEARCH and DEVELOPMENT

A conclusion of the Aging Aircraft Conference was that there is a serious deficiency in the industry's ability to transfer NDI technology and to apply NDI research to maintenance "production" problems. Over the course of the last two years, the Steering Committee has heard presentations from a number of private enterprises with interests in the area of NDI and its associated technology.

We conducted a two day meeting in March of 1989 that was attended by all of the constituencies in the government and industry interested in some aspect of aging aircraft diagnostics. Although NDI was a primary topic of discussion, presentations were also given on fracture mechanics analysis, proof testing, and corrosion control. The result of that meeting was input to the FAA to be used in developing their R&D plan for aging aircraft research.

It is apparent that the AATF Steering Committee has no authority to make a binding commitment to any of the proposing organizations that have approached us since our meeting of last March. We have directed the R&D task group to analyze, under the direction of Boeing, all of the proposals we have heard and to coordinate with the FAA our recommendations for an R&D program. It is our understanding that the FAA is pointing toward a completion of their R&D plan during the summer of 1990.

The AATF will continue to utilize this task group to hear new ideas and to direct advice to the FAA through appropriate channels on these important topics.

HUMAN FACTORS

In October of 1988, the FAA held a Human Factors Conference addressing aging aircraft issues that were identified during the International Aging Aircraft Conference. The Human Factors Conference was attended by a wide spectrum of interests of the industry, government, and academia. This was the first step in the FAA's plan to develop an Aging Aircraft Research Program in Human Factors.

Since the FAA was taking the lead in this area, the AATF Steering Committee decided that it was most practical to assist the FAA in their program rather than activate this Task Group on a parallel path.

COMMUNICATIONS:

As mentioned earlier, a Communications Task Group was established (now called the International Airworthiness Communications Committee) to examine the global problem of data gathering, analysis, and feedback of operations and maintenance events that may have significance in the early detection of fleet reliability and safety problems.

The short term goal of this group is to make recommendations to the FAA regarding the SDR (Service Difficulty Reporting) System currently in use in the United States.

For the longer term we will be interested in how the FAA's SDR System can be integrated with the reporting systems currently in use by other regulatory authorities around the world.

Questions that will be considered by this committee include:

1. Is it possible to collect data for specific fleets on a world-wide basis?

2. Is there a way the manufacturers could be used to collect, analyze, and disseminate data on a global basis to the operators and the regulatory authorities without imposing undue liability on the individual companies?

3. Can an expert system be developed using artificial intelligence technology to analyze the tremendous amount of information available to spot significant data trends and events?

4. Does the official notification and action system structure need revision (service bulletins, advisory circulars, ADs, etc.)?

5. How can we apply simplified language to the basic manuals and to the ongoing notifications in order to assure accurate interpretation?

The next meeting of this group is scheduled for early May of this year. At that meeting will will consider the recommendations of the three working groups in regard to the SDR system. We finalize our recommendations to the FAA shortly after that meeting.

FEDERAL AVIATION ADMINISTRATION:

After the International Aging Aircraft Conference, the FAA, considering the early work of the AATF made a fundamental policy change. It was determined that continued inspection of an airplane for evidence of the occurrence of a known problem for that model airplane is an unacceptable procedure to assure safety. Modification or replacement of parts must be accomplished to preclude the occurrence of a problem.

That change in policy in conjunction with known conditions existing in certain Boeing airplanes led to a series of ADs that have had a significant impact on the cost of maintaining older aircraft:

B737 AD - Install new fasteners, 100 U.S. aircraft,
B727 AD - Install new fasteners, 623 U.S. aircraft,
DC-9 AD - SSID, 244 U.S. aircraft,
DC-10 AD - SSID, 136 U.S. aircraft,
B737 AD - 58 Service Bulletins, 1200 aircraft,
B727 AD - 74 Service Bulletins, 1700 aircraft,
B747 AD - 31 Service Bulletins, 680 aircraft,

Pending actions as a result of the AATF recommendations:

DC-8 AD - 52 Service Bulletins, 346 aircraft,
DC-9 AD - 52 Service Bulletins, 920 aircraft,
MD-80 AD - 22 Service Bulletins, 568 aircraft,
DC-10 AD - 33 Service Bulletins, 426 aircraft,
L1011 AD - 46 Service Bulletins, 243 aircraft,

The AATF has submitted recommendations for corrosion programs for Boeing and Douglas fleets. The Boeing NPRM was released early in March and served as the baseline program for all other fleets. The corrosion program will require inspection action at the following frequencies for all aircraft assuming AATF recommendations will not be altered as a result of comments received by the FAA in the NPRM process:

AATF CORROSION INSPECTION INTERVALS

INSPECTION AREA	727	737	747	DC8	DC10
EXTERNAL FUSELAGE	6/1.5	8/2	10/5	20/2	5/5
INTERNAL FUSELAGE	10/8	8/8	15/8	20/6	20/10
FUSELAGE BILGE	6/3	6/4	6/4	20/3	5/3
EXTERNAL WING	10/5	8/4	10/2	20/2	4/4
INTERNAL WING	10/10	10/10	20/10	20/6	10/10
EXTERNAL STABILIZER	10/2	10/2	10/5	20/2	10/5
INTERNAL STABILIZER	10/8	10/8	10/8	20/6	15/10

NOTES:

1. FIRST NUMBER IS IMPLEMENTATION AGE IN YEARS
2. SECOND NUMBER IS REPEAT INTERVAL IN YEARS

The FAA contemplates the following actions in the near future:

An AD for the B727 fleet requiring ultrasonic inspection of all lap joints for disbonding, skins less than .056 inches, cold bonded joints, within six months of effective date.

Require SID programs for all airplanes certified to CAR 4b or FAR Part 25.

Amend FAR Part 25.571 to require 2 life times fatigue test.

Issue a revision to AC 25.575.

Propose an SFAR to require fatigue testing of existing airplanes to two lifetimes. This would be a retroactive rule.

Issue a new AC 25.129.

Issue a new AC on aging aircraft policy.

In addition to the regulatory actions, the FAA has established an extensive Human Factors research program dealing with aging aircraft issues. A third conference is scheduled for June of 1990. The result of all of the research now in progress will be a Human Factors Handbook dealing with the maintenance of aging aircraft. The chapters proposed for this handbook will include:

Information Transfer/Communications,

Work Environment,

Selection/Training,

Equipment/ Job Performance Aides,

Inspection Methods,

Human Limits,

Problems of Vigilance/Boredom/Complacency, and

NDI Reliability.

At United Airlines, we have adapted our maintenance programs and our five year plan to reflect all known pending actions related to our aging fleet. We currently operate just less than a hundred aircraft that are immediately affected by current and pending FAA actions.

We have chosen to take a pro-active role in all aging fleet activities to assure as orderly an evolution of programs impacting those airplanes as we can, given the political climate outlined above.

An indication of the impact of the new programs on our fleet is our planned manpower requirements for the heavy maintenance visits when we will accomplish most of the required work. We are on a four year schedule for these visits. In 1987, before the Aloha accident, we planned 18,000 manhours for a typical B727 visit and 13,000 manhours for a B737.

In 1990, after all of the aging aircraft activity evolved into definitive programs and considering a normal escalation for our older aircraft, we planned 31,000 manhours for a B727 visit and 35,000 manhours for a B737 visit.

The structural modifications mandated by the most recent AD will add 30,000 manhours to the B27 visits and 10,000 manhours to a B737 visit for the visit when those modifications are accomplished. We do not anticipate grounding any aircraft for non-compliance for the actions known or contemplated at this point in time.

I realize that some of the other presentations will contain similar information to the information in this presentation. However, if the repetition serves to make you aware that our business has changed and that there are enormous political pressures to take aircraft maintenance out of our control, then this meeting will have served its purpose. The minute we cease being pro-active in directing the efforts toward maintaining our aging fleets, we will find ourselves answering to a different master. Thank you for the opportunity to address you in this important conference.

STATEMENT OF

CAPTAIN WILLIAM MELVIN

CHAIRMAN, AIRWORTHINESS AND PERFORMANCE COMMITTEE

AIR LINE PILOTS ASSOCIATION

BEFORE THE

SUBCOMMITTEE ON AVIATION

COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION

U.S. HOUSE OF REPRESENTATIVES

MAY 1, 1990

HR 3774, AGING AIRCRAFT SAFETY ACT

Good morning Mr. Chairman and members of the Subcommittee, I am William Melvin, Chairman of the Airworthiness and Performance Committee of the Air Line Pilots Association. I am also a Captain with Delta Air Lines, flying the L-1011. The Air Line Pilots Association represents the professional interests of 42,000 pilots who fly for 50 airlines. ALPA is pleased to be able to present its views on H.R. 3774.

As you may know, the motto of ALPA is "Schedule with Safety." We represent the safety interests of our pilot members and, hence, the safety of the traveling public. We are pleased that Congress is continuing to take an active role in aviation safety and congratulate you, Mr. Chairman, and the members of this

subcommittee for your ongoing efforts to enhance the safety of our members and the travelling public.

ALPA Supports the Intent of HR 3774

The intent of HR 3774 is to ensure that aged aircraft are safe and will continue to be airworthy as long as they are flying. Obviously, ALPA supports that concept. ALPA believes that there are three important actions which are necessary for continued airworthiness throughout an aircraft's lifetime:

1. Quality initial design and fabrication proved adequate by fatigue testing.

2. Continuous quality maintenance to include fixes and repairs.

3. Verification of airworthiness through inspection.

All of these actions are important. They are interrelated and all three must be accomplished to ensure safe airplanes. ALPA views HR 3774 as an attempt to accomplish the third item above --verification of airworthiness via inspection. We support this concept, but believe that the bill could be changed to more clearly accomplish the intent.

Before specifically addressing HR 3774, we would like to briefly cover the aforementioned three items which are fundamental to continuing airworthiness and germane to the aging aircraft issue.

Design, Fabrication, and Fatigue Testing

The U.S. has a fairly well-defined certification process which has changed and matured over the years. Aircraft designs have also made significant changes since the early days of unpressurized piston driven propeller aircraft. Mandated design/certification concepts such as "fail-safe" and "damage-tolerance" have gone a long way toward improving the reliability and safety of aircraft as they age. However, these relatively sophisticated concepts are inadequate to cope with the two major problems associated with aging aircraft over which the manufacturers have little or no control -- multiple site damage (fatigue) and corrosion. The keys to overcoming these problems are fatigue testing, quality maintenance, and detailed inspection by the operator.

The pivotal point when discussing aging aircraft is the life expectancy. Full-scale fatigue testing is an optional, but well proven, means employed by manufacturers to estimate the life

expectancy of an airplane. Most manufacturers conduct fatigue testing in order to verify their engineering calculations and choice of materials. The common practice is to test to twice the expected lifetime in hours and cycles. However, since fatigue testing is not mandated, the initial life expectancy of many aircraft is not accurately established. Without this lifetime to serve as a baseline coupled with adequate maintenance and inspection, the question of when an airplane becomes "old" is not well defined.

Similarly, corrosion preventive measures are taken by manufacturers during design, construction, and certification, but this again should not be left up to a manufacturer's prerogative. Some type of a basic anti-corrosion policy is needed which would be mandated as part of the certification process. Corrosion control is fundamental to the fatigue testing idea, since the outcome of fatigue testing is dependent on a sound structure. A corroded structure will not be able to withstand fatigue as long as the original test time.

There are several terms currently being used to discuss aging aircraft issues which are not well defined and mean different things to different people. HR 3774 refers to "economic design life." Other similar terms are "design life," "life limit,"

"initial design life," "safe life," "service life," "design service life," "operational life," "initial operational life," etc. When redrafting HR 3774, we believe it would be prudent to define the "life" term so that everyone understands that we are talking about a service life that has been established by mandatory full-scale pressurization fatigue testing to at least twice the service life value.

Maintenance

Even if there is an aircraft that is the ultimate in design and has passed extensive initial tests and certification, if it is not properly maintained, it will not last. Proper maintenance is the key to maintaining airworthiness. While ALPA does not believe that maintenance can make an airplane last forever, we do acknowledge its importance, and without it, the original design life cannot be reached.

The FAA does have regulations and policy which define an acceptable maintenance program. The normal practice is for an airline to structure its maintenance program in accordance with the regulations and then have it approved by the FAA. This is a valid approach since different airlines operate in different environments and obviously can't be all the same. However, there

is room for improvement. We think the FAA can do more to standardize the requirements for an airline maintenance program. ALPA believes that a mandated corrosion control program should be developed. The detail involved in specific airline programs will obviously vary depending on environmental factors. But the fact remains that all airlines need a corrosion control program. We are glad to see that the FAA, in consultation with the aviation industry, will be implementing corrosion control programs.

HR 3774 recognizes the importance of maintenance because it calls for "a review of maintenance and other records pertaining to the aircraft for the purpose of determining whether or not the aircraft is safe to continue to be used to provide air transportation." HR 3774 also requires an inspection to ensure that "maintenance of the aircraft's structure, skin, and other age-sensitive parts and components has been adequate."

Together these two actions give one a feeling of confidence.

Service Difficulty Reporting System

ALPA would like to take this opportunity to briefly cover one area that we discussed in depth in our aging aircraft statement to this subcommittee on September 27, 1989. The Service

Difficulty Reporting (SDR) System is an important part of a quality maintenance program. The SDR System identifies items that have failed (or are near failure) and need fixing. If you don't have a comprehensive SDR System, you may have items which fail and cause accidents but which could have been fixed before failure if properly identified.

ALPA has been vocal in its criticism of the SDR System for several years, and we are not alone. In fact, the FAA recognized that the SDR System was inadequate in 1984 when they solicited aviation industry comments on how to improve it. Unfortunately, five years have passed and no noticeable changes have been made.

The first problem with the existing system is that a system is only as good as the information that is being reported to it. Whenever you have a database which utilizes a data gathering system with problems, it is quite obvious that you may miss a potential problem. <u>The present system would be much more effective if more reports were mandatory and standardized</u>.

Assuming that the system could be standardized and mandated, the next step to make this a truly effective program would be the development of the capability to analyze the data. The FAA does not have the resources to perform this task in an effective

manner today. Without this capability, mandating the collection of standardized format data is not worthwhile. However, with the necessary resources, we believe that proper analysis of a good database would have tremendous payoff, not only in safety benefits, but a direct economic benefit to individual airlines.

Even if the present system identifies a problem and recommends a fix, the fix may not be accomplished (it may be optional) or the fix may be incomplete; some Airworthiness Directives (ADs) include only part of a Service Bulletin (SB). There is a need for a tightening-up on implementation procedures. The AD system usually results in adequate fixes <u>if</u> an AD is published. However, there are all kinds of pressures that come to bear on the FAA. These pressures may prohibit the AD from being published or delay it. With an improved SDR System, some of these pressures may be reduced or eliminated.

These suggested improvements to the SDR System will result in better aircraft maintenance and, hence, help extend the life of aircraft.

<u>Verification of Airworthiness Through Inspection</u>

Actual inspection is the only way to verify that a particular

airplane is, in fact, completely airworthy. This assumes, of course, that the inspection is a quality inspection and proper procedures and techniques are used.

HR 3774 would require the FAA to conduct an additional inspection during the last year of an aircraft's economic design life. ALPA supports the idea of conducting this inspection, but believes it could be worked into a carrier's normal maintenance program. We believe that this inspection could be adequately carried out by the airline with FAA oversight.

HR 3774 Comments Summary

Now that we have established an overview of ALPA's philosophy and policy on Aging Aircraft, we are better equipped to examine HR 3774.

The vital element in the discussion of aging aircraft is the concept of a service life. The bill should require that a service life be established for each aircraft type. That service life must be determined by using acceptable engineering techniques such as full-scale pressure fatigue testing.

Extensions to the service life should not be indefinite. They

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must be for a specified period. Again, that period must be derived using sound engineering practices and fatigue testing.

Recommended Changes to HR 3774

In order to incorporate the previous ideas, ALPA recommends that Section 2 of the proposed bill be rewritten as follows:

SEC. 2. RULEMAKING PROCEEDING.

Not later than 180 days after the date of the enactment of this Act, the Administrator of the Federal Aviation Administration shall initiate a rulemaking proceeding for the purpose of issuing a rule that would:

(1) require a service life be established for each aircraft type used by air carriers to provide air transportation, based on fatigue testing and valid engineering practices.

(2) establish a method for extending an original service life, if necessary, to a new service life based on sound engineering practices and testing.

(3) require an operator, before flying each aircraft into its

extended service life, under FAA oversight, to:

(a) conduct an approved inspection of each aircraft and the maintenance program used by that operator during the original service life of each aircraft.

(b) review maintenance and other records pertaining to each aircraft for the purpose of determining whether or not the aircraft is safe to continue to be used to provide air transportation and to determine the adequacy of previous inspections and maintenance.

(c) demonstrate to the Administrator as part of the inspection, that maintenance of each aircraft's structure, skin, and other age-sensitive parts and components has been adequate and timely enough to ensure the highest degree of safety beyond the original service life.

(4) establish a continuing program for reviewing and evaluating an aircraft periodically when operating an aircraft during an extended service life.

Mr. Chairman, that concludes my remarks and I would be happy to

answer any questions you may have.

ADDITION TO THE RECORD

United States General Accounting Office

GAO Testimony

For Release
on Delivery
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Observations on H.R. 3774, "The Aging Aircraft Safety Act of 1989"

Statement for the Record of
Kenneth M. Mead
Director, Transportation Issues
Resources, Community, and Economic
Development Division

Before the
Subcommittee on Aviation
Committee on Public Works
and Transportation
House of Representatives

GAO/T-RCED-90-82

GAO Form 160 (12/87)

Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to testify on H.R. 3774, "The Aging Aircraft Safety Act of 1989." The purpose of the bill is to reduce the safety risk of older aircraft and thus raise the public's confidence in the overall safety of the U.S. air transport fleet. Our observations today are based on a significant body of work that we have underway in the areas of aging aircraft, aircraft maintenance, and FAA (Federal Aviation Administration) oversight of that maintenance. We testified before your Subcommittee in October of last year that FAA needed an overall plan for coordinating activities in the aging aircraft area.[1] The Department of Transportation recently informed us that FAA is developing such a plan and we will be interested in reviewing the specifics of that plan.

Among other actions, H.R. 3774 would require that, within 1 year of reaching a predetermined age based on usage or the passage of time, each aircraft in the U.S. fleet be removed from service so that (1) FAA can review the aircraft's maintenance documentation to determine whether the aircraft is safe to continue service, (2) FAA can conduct a direct, on-site inspection of the aircraft, and (3) the aircraft operator can demonstrate to FAA that maintenance has been adequate and timely enough to ensure the highest degree of safety. If these three actions are accomplished successfully, FAA would allow the aircraft to continue to be used for air transportation for a period of time which is not specified in the bill. Thus, the bill is designed to provide a high degree of assurance that older aircraft remain airworthy.

While we agree that this assurance needs to exist, we believe that several practical obstacles will handicap successful

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[1]Aging Aircraft: FAA Needs Comprehensive Plan to Coordinate Government and Industry Actions (GAO/RCED-90-75, Dec. 22, 1989).

implementation of the legislation. For example, our work suggests that, because of the following scenarios, implementing the bill would either be economically frustrating or have other unintentional effects on FAA's inspection programs:

-- Enormous pressure would be placed on FAA's inspector work force over a relatively short time period. To inspect within 1 year the 1,400 aircraft that now qualify based on age, our work shows that FAA may have to dedicate almost three quarters of its airworthiness inspectors. This would severely constrain FAA's ability to effectively oversee its routine airline maintenance activities that are unrelated to aging aircraft.

-- In addition, we foresee a virtual inundation of the aircraft repair and maintenance industry with demand for services. Our preliminary analysis of this industry shows that during the near term the industrial capacity will not exist to accommodate the added demand on repair facilities that this bill would create.

These concerns notwithstanding, we believe that, with some modifications, the bill's goal of lowering the safety risk of older aircraft can be achieved with the resources available and without unduly affecting flight schedules, airfares, or other necessary routine fleet maintenance. In our statement, we propose and discuss three alternatives to the bill, including integrating the bill's requirements into other recent regulations for additional maintenance of the aging fleet, targeting a sample of the fleet for inspection, and inspecting a random sample of the fleet. We also suggest that FAA will need to work closely with industry in developing mechanisms that will enable FAA to stretch its resources over a broader area and target them as necessary at high-risk conditions.

H.R. 3774 CALLS FOR CLOSER SCRUTINY
OF EACH AGING AIRCRAFT

Many in the aviation community, including FAA and airline representatives, do not agree with the proposals outlined in H.R. 3774. In their opinion, this proposal implies that current airline maintenance practices under Part 121 of the Federal Air Regulations, coupled with existing FAA inspection oversight and enforcement policy, are not enough to assure the American public that each aircraft that has exceeded its economic design life is safe enough to continue flying. While no one would say that airline maintenance and federal inspection oversight are inadequate, the facts discussed below tend to undermine the confidence that can be placed in this system for assuring aircraft safety.

-- A few air tragedies, some involving older aircraft, in recent years have been attributed to inadequate maintenance and inspection oversight. For example, as brought out in this Subcommittee's hearings in September 1989, the National Transportation Safety Board attributed the 1988 Aloha Airlines incident primarily to the airline's failure to detect fuselage skin and structure defects on a 19-year-old aircraft, FAA's failure to require certain inspections proposed by the plane's manufacturer, and lack of action by FAA or the manufacturer to correct structural problems that were discovered early in the aircraft's production.

-- It is becoming more widely known that the nation's aging air transport fleet is an increasingly larger portion of the whole. Over 1,400 of the nation's 4,100-plane fleet have exceeded their economic design lives in terms of years-in-service and over 450 in terms of flight cycles (take-offs and landings). In fact, very few turbo-jet aircraft have ever been retired, and most will probably

see many more years of service. (See appendix I for additional information on the aging fleet.)

-- Little is known about the status of the older aircraft in the fleet because FAA does not keep records of individual aircraft by owner/operator, age, structural problems, or compliance with specific air safety regulations. This means that (1) unless an aircraft has recently undergone a comprehensive maintenance overhaul and (2) FAA inspectors were either present during the overhaul or reviewed its documentation, FAA cannot attest to the air safety status of a specific aircraft at any given time. This is one of the circumstances that H.R. 3774 is trying to correct.

INDUSTRY MAINTENANCE PRACTICES AND FAA OVERSIGHT DO NOT ASSURE INTEGRITY OF AGING FLEET

Our work in the areas of aircraft maintenance and FAA's oversight of this activity shows that a more structured approach may be needed to assure the integrity of the aging fleet. For example, we believe that each of the following factors could mitigate against the kind of high quality aircraft maintenance that the public expects:

-- Maintenance of even the same model aircraft is airline specific and can vary significantly across airlines. Moreover, aircraft often move frequently among airlines or from one lease arrangement to another and, therefore, are subject to a variety of maintenance practices, some of lower quality than others.

-- A significant segment of our fleet is always being operated and maintained out of the country where FAA has no official cognizance or jurisdiction.

-- Finally, FAA, the agency charged with overseeing airline maintenance, has had difficulty maintaining a sufficient inspector work force, training its inspectors to handle new problems such as corrosion, and adequately ensuring compliance with its regulations for maintaining airworthiness.

These factors are discussed in more detail below.

Closer Scrutiny Would Identify Variations in Maintenance Quality

Aircraft manufacturers and FAA have long known that not all aircraft maintenance is equal and that some maintenance can fall below the standard called for in the regulations. FAA was concerned with the aging fleet long before the Aloha incident. In May 1981, FAA issued Advisory Circular 91-56, which provided guidance to ensure the safe operation of older aircraft and kicked off manufacturers' aging-fleet surveys. Based on these surveys of older aircraft, manufacturers have learned that maintenance varies significantly from operator to operator and that corrosion is a more serious problem than fatigue. In describing their findings to us, Boeing officials said that not all operators' maintenance programs are equivalent. Moreover, the National Transportation Safety Board has documented poor maintenance practices--notably in its investigation of the Aloha 737 and two other similar aircraft belonging to Aloha. Because other cases of improper airline maintenance or inadequate FAA oversight of its maintenance regulations have occurred, a closer look at our aging fleet could identify and correct these problems, thus providing maximum assurance of the fleet's safety.

Complicating the variation-in-maintenance issue is the widespread practice for banks, trust companies, and equipment leasing companies to buy new and used aircraft and lease them back

to various U.S. and foreign operators. Under lease arrangements, some aircraft move frequently among operators and therefore are subject many different maintenance programs. As of March 1, 1990, 51 percent of the 4,125-aircraft U.S. fleet was leased. (See appendix II.) However, a leasing company does not always plan to own a plane over its whole lifetime. Two such aircraft and their various operators are shown in appendixes III and IV. Over a period of 9 years, 11 different operators were responsible for the maintenance of one of these planes. These operators, while not operating their aircraft unsafely, may not have as much economic incentive to perform the kind of high quality and costly maintenance that would extend the aircraft's life as might aircraft operators who own their planes. And the actual owners--the lessors--of the aircraft are often financial institutions that are not in close contact with the aircraft and its maintenance. Therefore, the quality and level of maintenance performed on aircraft that move frequently among operators, lessors, and other owners could be lower than that for operator-owned aircraft.

Foreign Owned, Operated, and/or Maintained Aircraft Pose Special Problem

Especially relevant to the merits of H.R. 3774 are the approximately 139 U.S. registered aircraft, or about 4 percent of the fleet, that are flown over foreign routes--with some U.S. points of arrival and departure--and maintained by foreign operators. These aircraft are required to be operated and maintained under federal aviation regulations enforceable by FAA; but because the aircraft are out of the country most of the time, FAA does not have a great deal of access to them. When the lease arrangement or ownership of one of these aircraft changes and it begins operation in the U.S., a requirement exists for the aircraft to be inspected to ensure compliance with FAA regulations. However, a special problem is presented at this point because no data base exists that FAA can turn to for the maintenance status--

including compliance with air safety regulations, aircraft age, ownership, and schedule of planned mandatory repairs--of a specific aircraft that is identified by tail or serial number. This is further support for establishing an air safety inspection process for older aircraft during which the current operator can demonstrate that the aircraft has been properly maintained throughout its life and continues to be airworthy.

FAA's Shortage of Qualified Personnel Makes Adequate Inspection Difficult

FAA has had longstanding problems in recruiting and retaining aircraft safety inspectors. Although the agency's goal is to have 3,100 inspectors on board by the end of 1991, as of April 1, 1990, FAA had only 2,128. Only about 930 are assigned to oversee the maintenance programs of the major airlines, and only about half of this number have a specialty in structural airworthiness. Furthermore, FAA's current inspector staffing did not allow for (1) the recent emphasis to perform more direct inspection of aircraft instead of relying on reviews of maintenance documentation, (2) growth in the size of the commercial fleet, or (3) an emerging need for oversight of an expanding domestic and foreign repair station industry. Also, developing courses for special airworthiness hazards, such as corrosion, has been stalled at the FAA Academy for lack of personnel.[2] Finally, we reported recently that FAA's oversight of its airworthiness directive program is inadequate to determine whether airlines are complying with the directives[3] and

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[2]Aviation Training: FAA Aviation Safety Inspectors Are Not Receiving Needed Training (GAO/RCED-89-168, Sept. 14, 1989).

[3]Aviation Safety: Management Improvement Needed in FAA's Airworthiness Directive Program (GAO/RCED-90-94, Feb. 16, 1990).

that its inspection management system needs attention from FAA management.[4]

IMPACT OF H.R. 3774 ON FAA AND THE AVIATION INDUSTRY

If passed, H.R. 3774 should have a positive impact on one of FAA's major goals--ensuring the safety of air travel. And, no doubt, requiring inspection of each aircraft's airworthiness before it exceeds its economic design life would add substantially to the safety of the aged fleet. However, there would, of course, be costs associated with this additional assurance. Record checks and aircraft inspections are time-consuming tasks, and airline officials have told us that every day an aircraft is out of service costs an airline $25,000 to $30,000. Such out-of-service opportunity costs will cause financial strain to all airlines affected and could be catastrophic to small airlines that cannot afford to ground their aircraft for extended periods. Thus, inspecting aging aircraft will pose a familiar dilemma to FAA: balancing air safety against the economic impact of such safety on the aviation industry.

In addition, taking actions to maximize safety could create more workload than can be accomplished with existing resources. The two kinds of resources that will be in short supply are FAA inspectors and repair facilities that can inspect and work on large transport aircraft. We have some options, however, for the Subcommittee's consideration that we believe would accomplish the bill's goals but would be less resource intensive.

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[4]Aviation Safety: FAA's Inspection Management System Lacks Oversight (GAO/RCED-90-36, Nov. 13, 1989).

Insufficient Number of FAA Airworthiness Inspectors

Section 2 of H.R. 3774 would require FAA not only to review the maintenance paperwork of all aircraft exceeding their economic design life, but also to perform a direct structural inspection of that portion of the fleet. FAA estimates that this airworthiness audit would take a team of six inspectors a minimum of 2 weeks to thoroughly review paperwork and inspect the aircraft's structural integrity. Given that about 1,400 of the over 4,100 aircraft in the U.S. fleet have currently exceeded 20 years in service, the immediate task of inspecting these aircraft within the 1-year period specified in the bill is very time-consuming and labor-intensive. Moreover, every year more and more of the fleet will exceed its economic design life and qualify for inspection.

Assuming that an age criterion is used rather than the number of flights or flight hours, we estimate the immediate impact that this task would have on FAA inspector workload is as follows: Teams of 6 inspectors (including inspectors with structural expertise) working 2 weeks each on 1,400 aircraft would require about 350 staff-years, or 350 people working for 1 full year. FAA currently has a total of a little over 2,100 inspectors, approximately 930 of whom are assigned to oversee maintenance programs of Part 121 scheduled air carriers. Of the 930, about 493 are airworthiness inspectors. This means that almost three quarters (350 out of 493) of FAA's qualified inspector work force would be required to accomplish the bill's objectives. With this many inspectors focused on a single task, FAA may be hard-pressed to effectively accomplish its other safety compliance tasks. These tasks include overseeing airline maintenance on a daily basis; approving changes to airline maintenance programs, modifications to aircraft, and changes to fleet composition; evaluating airline maintenance training programs; and performing enroute, ramp, and facility inspections.

Inadequate Repair Station Capacity to Accommodate Repair Work

In addition to the added pressure that the bill would put on the inspector work force, H.R. 3774 would create severe scheduling problems for the repair station industry. This is because proper inspection of an aircraft should be done while the aircraft is completely enclosed inside a permanent structure, out of the weather and wind. The number of such structures that can be used for this purpose, however, is limited.

On the basis of our observations and discussions with officials U.S repair stations--both independent and airline owned--we have identified about 50 repair stations in the U.S. that can physically accommodate large transport aircraft and that have the capability to maintain these aircraft. While some of these stations are owned by major U.S. airlines and have several large hangars that can completely accommodate a dozen or more aircraft, others are smaller independent facilities that can enclose only a few aircraft at one time. To provide a rough estimate of the industry's ability to respond to the bill's requirements, we asked a sample of both airline and independent repair stations what portion of their capacity was projected to be used in 1990. Overall, the five airlines and four independent repair stations that we surveyed reported operating at or near 100 percent of capacity. One independent repair station even turned away more aircraft than it worked on in 1989. Moreover, these repair station officials told us that because of skilled labor and space shortages, the industry cannot expand in the near term to meet any significant increase in demand.

Therefore, to respond to H.R. 3774's requirements for inspecting older aircraft, the airline industry would have to displace or postpone a large amount of scheduled repair and maintenance. This could mean grounding some aircraft, raising

airline costs, and eventually affecting airfares and reducing flight service.

OPTIONS TO THE APPROACH OUTLINED IN H.R. 3774

Recognizing the practical obstacles to full implementation of H.R. 3774, we have identified three options that lessen the impact on inspector and repair station resources by either reducing the number of aircraft to be inspected or extending the time period for accomplishing this task. Below we describe the three options; however, others or combinations of these also could be developed.

-- The 100 percent inspection requirement of the bill could be retained, but the inspections could be performed in conjunction with airlines' schedules for accomplishing repair work specified in a number of new air safety regulations recently issued by FAA. These proposed regulations address problems associated with aging aircraft, and FAA has given the airlines 4 years to comply. Combining the new regulations with the proposed inspections would spread out over 4 years the initial wave of 450 to 1,400 aircraft that have currently surpassed their economic design lives. (And over the 4-year period, more aircraft will be added to the first 1,400.) This alternative has the advantage of having a less severe impact on both FAA's inspection resources and the repair industry than the H.R. 3774 approach. This option would tend to promote air commerce (lessen the cost impact on operators) more than H.R. 3774 because it would spread the inspections out over a longer time period. The safety risk for the fleet due to inspecting some aircraft toward the end of the 4-year period could be lessened by scheduling the oldest aircraft first.

-- A random sample of each airline's fleet could be taken with the objective of evaluating the remainder of the airline's fleet based on the inspection results of the sample. Additional samples could be taken depending on the results of the evaluation. This sampling approach, coupled with testing of representative aircraft bodies to determine the time period over which the inspection would be valid, is an alternative that FAA says would accommodate their resources. While it, too, would be more practical than the 100 percent inspection options and would take fewer aircraft out of service, results of inspecting a sample could not be projected across an entire fleet without taking a fairly large sample. Moreover, this option would not raise assurance of safety on a plane by plane basis as much as the 100 percent inspection options, and its implementation would be complicated by the movement of aircraft in and out of an airline's fleet.

-- A "targeted" sample of aircraft could be selected from the U.S. fleet reflecting the quality of airline maintenance programs. Sampling criteria could be based, for example, on the results of manufacturers' aging-fleet surveys, FAA's ongoing inspection team visits to airlines, the amounts of civil penalties that FAA assessed airlines for violations, and other indications of maintenance program quality. Depending on the results of inspecting the sample, other samples could continue to be taken and maintenance programs and practices could be altered or the status quo retained as appropriate. This option would not ensure as high a degree of safety on a plane by plane basis, but it is more practical than the 100 percent inspection option in terms of resource use. It also is sensitive to airlines' need to keep their aircraft in service. Moreover, this option is in line with a recommendation we made in our management review of the Department of Transportation in which we said

that FAA should use safety data to target its inspector resources at high-risk conditions.[5]

Regardless of which of these or other options the Subcommittee may wish to consider and eventually implement, FAA will need to make many decisions about how it will use its inspector resources. While aircraft inspection and structural expertise exists in the private sector that can supplement FAA staff, taking advantage of it will require advance planning and coordination. For example, FAA is exploring the concept of a "self-audit" capability that would exist within an airline that already has a qualified quality assurance organization. While this is an emerging issue and FAA has only within the last year begun to explore its application to aircraft maintenance and inspection activities, it is highly relevant in the context of H.R. 3774 because of the impact that bill could have on FAA inspector resources.

Aircraft operators also will need to plan ahead. It will be imperative for each operator to forecast how this legislation will apply to his fleet and make early plans for scheduling the inspections within the repair industry's capacity to provide the services.

In short, achieving the bill's goals will not be easy. It will require some sacrifices and much coordination on the parts of many members of the aviation community. To better ensure that this happens and regardless of which approach the Committee chooses to implement the legislation, the Committee may wish to consider adding to Section 2 (6) of the bill the requirements that FAA

-- track maintenance status and other information using a tail

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[5]See Department of Transportation: Enhancing Policy and Program Effectiveness Through Improved Management (GAO/RCED-87-3, Apr. 13, 1987).

or serial number-based system and thus provide a basis for choosing which aircraft to inspect first and

-- establish a plan for working with operators and manufacturers for the purposes of augmenting FAA staff resources and scheduling aircraft through the inspection process.

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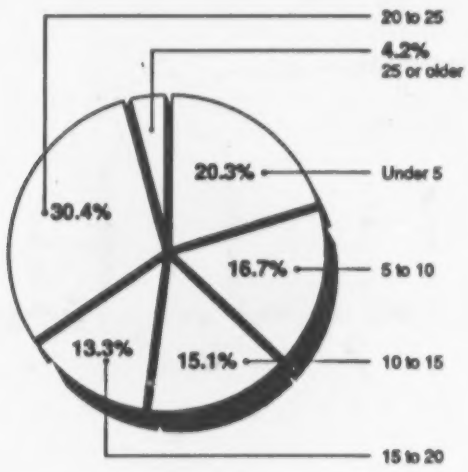
In summary, we agree that if an older aircraft is to remain in commercial service, a hard look must be taken at its maintenance record and at the plane's structural integrity. FAA, however, will not be able to do this alone; it will need the resources and support of the manufacturers and major air carriers. Moreover, achieving the bill's goals in a single year could exceed the repair industry's capacity to effectively provide such services. Instead, focusing first on the oldest or most used aircraft in an orderly, scheduled fashion would minimize disruption of the air travel industry. At the same time, this will have a positive impact on reducing the risk of an air tragedy due to structural fatigue or corrosion.

Mr. Chairman, this concludes our statement. We would be pleased to answer questions that you or other Subcommittee Members may have.

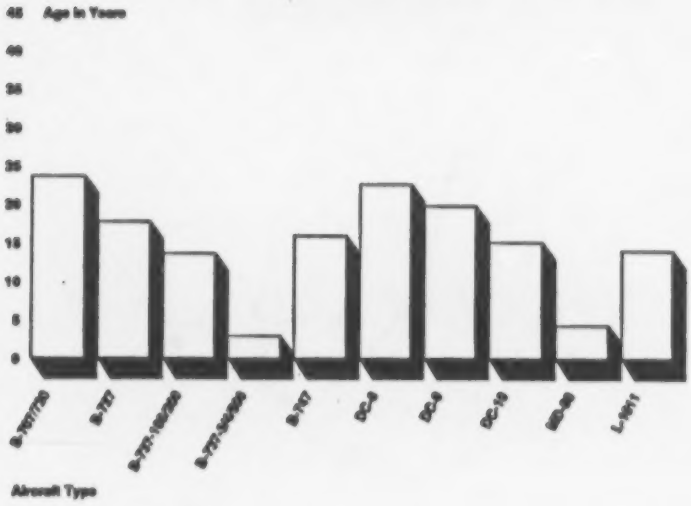
Profile of Aging Commercial Jet Transport Fleet

Figure I.1: Age Distribution of U.S. Fleet
(As of March 1990)



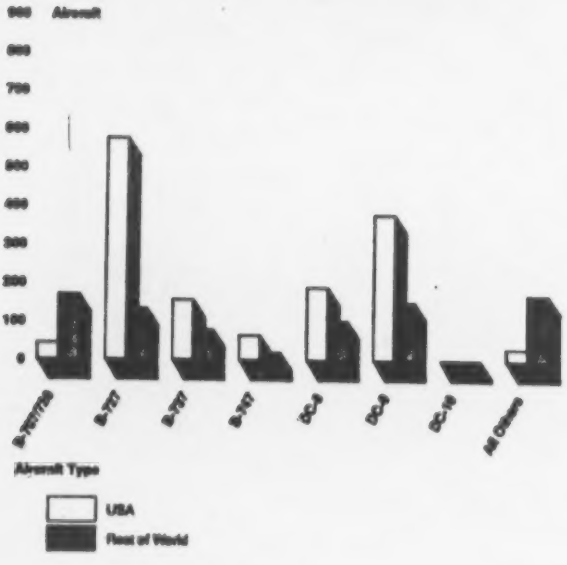
Source: Aviation Data Service

Figure I.2: Average Age of U.S. Manufactured Aircraft in the U.S. Fleet
(As of March 1990)



Source: Aviation Data Service

Figure I.3: Aircraft 20 Years Or Older: U.S. vs Rest of the World (As of March 1990)



Source: Aviation Data Service

Table I.1: U.S. Manufactured Aircraft That Exceed Design Life In Cycles (As of March 1990)

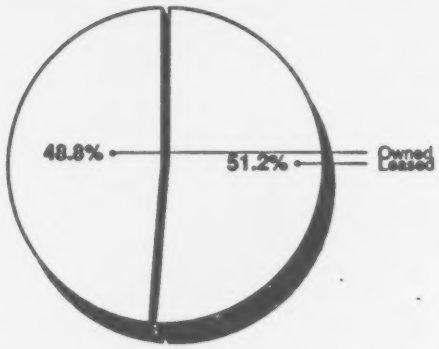
Aircraft Type		Design life cycles	Number exceeding design life in cycles	
			USA	Rest of World
Boeing	707/720	20,000	15	117
	727	60,000	8	6
	737	75,000	2	0
	747	20,000	1	18
Douglas	DC-8	25,000	35	17
	DC-9	40,000	407	212
	DC-10	42,000	0	0
Total			468	370

Source: Aviation Data Service

Appendix II

Information on Leased Aircraft in the U.S. Fleet

Figure II.1: Leased and Owned Aircraft in U.S. Fleet
(As of March 1990)



Source: Aviation Data Service

Appendix II

Table II.1: Leased Aircraft By Aircraft Type in The U.S. Fleet
(As of March 1990)

Aircraft Type		Owned	Leased	Total	Percent Leased
Boeing	707/720	23	20	43	46.5 %
	727	666	531	1197	44.4
	737-100/200	177	236	413	57.1
	737-3/4/500	120	252	372	67.7
	747	93	89	182	48.9
	757	67	89	156	57.1
	767	47	64	111	57.7
Douglas	DC-8	118	82	200	41.0
	DC-9	280	241	521	46.3
	DC-10	117	68	185	36.8
	MD-80	159	248	407	60.9
Lockheed	L-1011	52	54	106	50.9
All Others		96	136	232	58.6
Total		2015	2110	4125	51.2 %

Source: Aviation Data Service

Appendix III

History of Select Leased Aircraft

Table III.1: Leasing History of a Late Model Boeing 737 (Serial Number 22453) (As of March 1990)

Operator	Timeframe	Country of Operation
Air Belgium	3/81 to 3/81	Belgium
Bahamasair	3/81 to 4/81	Bahamas
Air Belgium	4/81 to 4/81	Belgium
Eagle Air	4/81 to 4/81	Iceland
Britannia	4/81 to 11/81	United Kingdom
Eagle Air	11/81 to 11/81	Iceland
Air Belgium	11/81 to 10/82	Belgium
Orion Airways	10/82 to 10/82	United Kingdom
Air Belgium	10/82 to 3/83	Belgium
Wien Air Alaska	10/83 to 4/84	United States
Orion Airways	4/84 to 11/84	United Kingdom
IFLC	11/84 to 12/84	United States
America West	12/84 to 4/88	United States
Amberair	4/88 to 10/88	United Kingdom
Paramount Airways	10/88 to 11/88	United Kingdom
Dragonair	11/88 to 4/89	Hong Kong
Paramount Airways	4/89 to 10/89	United Kingdom
Dragonair	10/89 to present	Hong Kong

Source: Aviation Data Service

Table III.2: Leasing History of A Late Model Boeing 727 (Serial Number 21349)
(As of March 1990)

Operator	Timeframe	Country of Operation
Singapore Airlines	10/77 to 6/80	Singapore
Dan-Air London	6/80 to 11/81	United Kingdom
LACSA	11/81 to 4/82	Costa Rica
Dan-Air London	4/82 to 10/82	United Kingdom
LACSA	10/82 to 4/83	Costa Rica
Dan-Air London	4/83 to 10/83	United Kingdom
LACSA	10/83 to 4/84	Costa Rica
Dan-Air London	4/84 to 1/85	United Kingdom
Sun Country Airline	1/85 to 4/85	United States
Dan-Air London	4/85 to 12/85	United Kingdom
Sun Country Airline	12/85 to 4/86	United States
Dan-Air London	4/86 to 1/87	United Kingdom
Sun Country Airline	1/87 to 4/87	United States
Dan-Air London	4/87 to 12/87	United Kingdom
Sun Country Airline	12/87 to 4/88	United States
Dan-Air London	4/88 to 12/88	United Kingdom
Sun Country Airline	12/88 to 4/89	United States
Dan-Air London	4/89 to 12/89	United Kingdom
Sun Country Airline	12/89 to present	United States

Source: Aviation Data Service

Information on U.S. Aircraft Operating Overseas

Table IV.1: U.S. Registered Aircraft Operated Overseas by Aircraft Type and Location (As of March 1990)

Aircraft Type		Number	Location
Airbus	A-300	2	Venezuela
Boeing	707/720	9	Netherlands, Uruguay, Guyana, Peru, United Kingdom, Antigua, Dominican Republic
	727	27	Columbia, Peru, Venezuela, Brazil, Costa Rica, Mexico, Bahamas
	737	20	Zaire, El Salvador, Greece, Australia, Norway, West Germany, Guatemala
	747	33	Uk, New Zealand, Philippines, Netherlands, Lebanon, France, Japan, Switzerland, Singapore, Taiwan
	757	1	West Germany
	767	2	El Salvador, Columbia
Douglas	DC-8	6	Liberia, Costa Rica, Zambia Dominican Republic, Surinam
	DC-9	3	Mexico, Guatemala
	DC-10	15	Mexico, France, Zambia, Nigeria, Finland, Malaysia, Indonesia
	MD-80	13	Argentina, Mexico, Netherlands Antilles
Lockheed	L-1011	6	Egypt, Ivory Coast, Bahrain, Trinidad
Others		2	South Africa
	Total	139	

Source: Aviation Data Service

Table IV.2: U.S. Registered Aircraft That Have Been Operated Overseas by Aircraft Type
(As of March 1990)

Aircraft type		Fleet size	Number operated overseas	Percent operated overseas
Airbus	A300	67	2	2.9 %
	A310	19	0	-
	A320	6	0	-
Boeing	707/720	43	37	86.0
	727	1,197	142	11.9
	737	785	91	11.6
	747	182	21	11.5
	757	156	2	1.3
	767	111	2	1.8
Douglas	DC-8	200	134	67.0
	DC-9	521	146	28.0
	MD-80	407	8	2.0
	DC-10	185	36	19.5
Lockheed	L-1011	106	7	6.6
All others		140	26	18.6
Total		4,125	654	15.9

Source: Aviation Data Service